

INFORMATION TO USERS

This dissertation 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.

University Microfilms

300 North Zeeb Road
Ann Arbor, Michigan 48106
A Xerox Education Company

73-15,323

HEAD, Bernard Charles, 1942-
3RD-PERSON NON-ZERO SUM GAME THEORY.

The University of Oklahoma, Ed.D., 1972
Education, administration

University Microfilms, A XEROX Company, Ann Arbor, Michigan

University of Oklahoma

Graduate College

3RD-PERSON NON-ZERO SUM GAME THEORY

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

degree of

DOCTOR OF EDUCATION

November 12, 1972

Charles Head

3RD-PERSON NON-ZERO SUM GAME THEORY

APPROVED BY:

Richard B. S. _____
Glen R. Sinden _____
James D. Sinden _____
Josh T. Baker _____

PLEASE NOTE:

Some pages may have

indistinct print.

Filmed as received.

University Microfilms, A Xerox Education Company

ACKNOWLEDGMENTS

I would like to take this opportunity to thank my chairman, Dr. Bibens, and the members of my doctoral committee, Dr. Parker, Dr. Snider, and Dr. Kidd, for the assistance they gave to me throughout my program. And a most grateful thanks is due my wife, Joanna, without whom I could not have succeeded, and my patient children, Andy, Jennifer, and Jonathan.

TABLE OF CONTENTS

Chapter

I. INTRODUCTION	1
Statement of the Problem	2
Hypothesis	2
Population	2
Definition of Terms	3
Background	7
3rd-Person Game Theory	11
Experimental Design	16
Method	17
II. REVIEW OF THE LITERATURE	20
III. DESIGN OF THE STUDY	32
Scoring	34
Tallying	42
IV. PRESENTATION OF THE DATA	46
Statistical Test Results	46
Interpretation of the Results	55
V. SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS	64
Summary	64
Findings	67
Conclusions	70
Recommendations	71
BIBLIOGRAPHY	73
APPENDIX I	76
APPENDIX II	82
APPENDIX III	84
APPENDIX IV	86

LIST OF ABLES

Table	Page
1. Game Considerations	49
2. Value Issues	50
3. Judgment No. 1	50
4. Judgment No. 2	51
5. Involvement	52
6. Sensitivity	52
7. Dependency	53
8. Decisiveness	53
9. Leadership	54
10. Output	54
11. Time	55

LIST OF ILLUSTRATIONS

Figure	Page
1. Categories of Games	3
2. Typical 2-Person Game Theory Matrix	4
3. Battle of the Sexes Game Matrix	7
4. Non-Negotiated Win Probabilities in Battle of the Sexes Game	10
5. Negotiation Set for Battle of the Sexes Game .	10
6. 3rd-Person Non-Zero Sum Game Matrix	12
7. Matrix Showing Utility Relationship Between Players A and B	15
8. Experimental Design	17

3RD-PERSON NON-ZERO SUM GAME THEORY

CHAPTER I

INTRODUCTION

The modern mathematical approach to conflict situations is attributed to von Neumann in his papers of 1928 and 1937. Game theory, as the mathematical approach to conflict situations is called, does not encompass all the diverse problems which are present in real life situations. However, as an abstraction of real life situations, game theory does provide an excellent means of examining conflict situations and the possible combinations of decisions that are aimed at reducing the level of conflict. However, there are some deficiencies in conventional game theory; some of the most common conflict decisions that an administrator must resolve are not dealt with by traditional game theory. This study was aimed in that area; the area in which conflict was found but the administrator was not directly a party to the conflict. In effect, the study selected some points from game theory, which is based upon rational decision making according to the decision maker's utilities, and modified them to meet the particular type of conflict situation wherein the decision maker was not a party to the conflict. The investigator has labeled the results 3rd-person non-zero sum game theory.

Third-person non-zero sum game theory used the terms and definitions of traditional game theory, but the power to make the decision was not given to those actually involved in the conflict as is done in normal game theory. There are several decision theories available that were designed for this sort of conflict situation, but they were not readily quantifiable and hence were not as testable as was a decision theory based upon game theory. Therefore, 3rd-person non-zero sum game theory used traditional game theory terms and definitions to explain conflict-resolving decisions that were traditionally explained in non-game theory terms. After 3rd-person non-zero sum game theory was completely developed, it was applied to real life practical school administrator situations and tested to ascertain its accuracy.

Statement of the Problem

The purpose of this study was to develop and test a model describing the decision-making procedure used by an administrator in internal conflict situations.

Hypothesis

On a conflict decision test developed in this study, an individual with knowledge of 3rd-person non-zero sum game theory will get a higher score than a person without that knowledge.

Population

Three test groups were selected from among graduate students at the University of Oklahoma with secondary school administrative experience and graduate students at the University of

Oklahoma with no administrative experience but who were aspiring to become administrators. The graduate students with administrative experience were assumed to represent the total population of Oklahoma administrators. The aspiring, but unexperienced, administrators were assumed to equal the first group on all points except experience. All of the subjects had at least completed the requirements for a master's degree.

Definition of Terms

Game Theory.--Game theory categorizes the games or the conflict situations into 2-person or N-person games and Zero sum or non-Zero sum games (see Fig. 1). Two-person games are those that involve two individuals or two groups that will act as two units. N-person games involve more than two persons or groups. Zero sum games are those in which the tally balances at the end of the game: what one party wins, another loses. Non-zero sum games are those in which the tally need not balance, all may win or lose, or any combination thereof may result.

	Zero sum	Non-zero sum
2-person		
N-person		

Fig. 1.--Categories of Games

The games are usually shown in a matrix such as Fig. 2. The four possible consequences are described as a, b, c, and d. Each player has a choice of two decisions which can be made with or without communications or prior knowledge of the other player's decision. If Player A selects Decision 1 and Player B

		Player B	
		1	2
Player A	1	a	b
	2	c	d

Fig. 2.--Typical 2-Person Game Theory Matrix

selects Decision 2, the results or consequences of their actions are 'b'. The game rules or the conflict situations determine if either player is able to communicate with the other player prior to disclosing their decisions.

Utility and Risk.--The desirability of each choice to each player is determined by two factors: utility and risk. The utility of each choice to each player is extremely difficult to determine. Utility generally describes something which is desirable or is sought after.¹ Therefore, a player's individual preferences determine the utility which he foresees in each choice. As an example, a rich man winning \$20.00 at poker has a different utility than a poor man winning \$20.00 at the same game. Further considerations must be given to the psychological aspects of the enjoyment of playing the game regardless of the amount won. Some individuals receive greater utility at winning a small sum through a bluff than winning a larger sum with a strong hand. Therefore, the assignment of various utility levels or payoffs to certain decisions is often a matter of subjective judgment

¹Guillermo Owen, Game Theory (Philadelphia: W. B. Saunders Co., 1968), pp. 124-135.

rather than objective, measurable quantities. However, one must always assume that each player seeks at all times to maximize his expected utility.

While the player is attempting to maximize his possible utility or gain, he must also be considering the likelihood of any possible loss. The probability of any loss and the amount of that loss is the risk element in any decision the player must make. The decision situation introduces the element of risk explicitly.² The degree of risk is determined by the player's conclusion as to the probability of winning or losing and the corresponding utilities of each choice. One must assume that each player seeks at all times to minimize his expected risk.

Rationality.--The rationality of each player must be recognized when a decision is being considered. In other words, when one is considering a possible decision, the rationality of the other player must be recognized because while attempting to maximize one's potential utility and minimize potential risk, the other player will be attempting to accomplish the same results. If in the particular game or situations, communication is allowed and each player has the opportunity to negotiate with the other player, each must not expect the other to accept a concession which the offering player would not accept.³

²Nathan Kogan and Michael A. Wallach, Risk Taking: A Study in Cognition and Personality (New York: Holt, Rinehart and Winston, 1964), p. 5.

³Robert E. Ohm, "A Game Model Analysis of Conflicts of Interest Situations in Administration," Educational Administration Quarterly (Fall, 1968), 75-79.

Strategy.--Another concept which must be dealt with in any discussion of game theory is strategy. Strategy is essentially a set of directions which tells a player what he is to do in every possible situation in which he may find himself while playing a particular game.⁴ A strategy is usually rather long and complicated if it is to take into consideration every possible move. As an example, before virtually identical moves are combined in the game of Tic-Tac-Toe, a single player's possible total number of options is 65,664,686,390,625.

Communication.--Another categorization of kinds of games is games with communication allowed and games with no communication. It is apparent that the best possible strategy (that which provides for the probability of the greatest utility and the least risk) may be different in the same game if communication is or is not allowed. If communication is allowed, the players have the opportunity to negotiate and reduce the risk probability and increase the utility probability.

Value.--In addition to the terms associated with game theory, 3rd-person game theory makes use of the concept of value. Value is often confused with utility; however, more specifically, value preceeds the notion of utility in that before the utility of a particular choice is to be estimated, the individual's values must be considered. Consider the earlier example of the

⁴Anatol Rapoport, Two-Person Game Theory: The Essential Ideas (Ann Arbor: The University of Michigan Press, 1966), p. 40.

rich man and the poor man each winning twenty dollars in a poker game; the utility of the twenty dollars was affected by the internal value system of each individual. According to Clyde Kluckhohn, value is implied by a code or a standard which has survived the test of time. Value is implied broadly by the term ethics or perhaps simply by that which the individual considers morally right or wrong.⁵

Background

A typical traditional game matrix (see Fig. 3) illustrating the previous concepts is the Battle of the Sexes. A man,

		Woman	
		b1	b2
		Fight	Ballet
Man	a1 Fight	2,1	-1,-1
	a2 Ballet	-1,-1	1,2

Fig. 3.--Battle of the Sexes Game Matrix

Source: R. Duncan Luce and Howard Raiffa, Games and Decisions: Introduction and Critical Survey (New York: John Wiley & Sons, Inc., 1958), p. 90.

Player 1, and a woman, Player 2, each have two choices for an evening's entertainment. Each can either go to a prize fight (a1 and b1) or to a ballet (a2 and b2). Following the usual

⁵Rollo Handy and Paul Kurtz, A Current Appraisal of the Behavioral Sciences, Preferential Behavior, Vol. II, No. 7 (Great Barrington, Mass.: Behavioral Research Council, 1964), p. 134.

cultural stereotype, the man much prefers the fight and the woman the ballet; however, to both it is more important that they go out together than that each see the preferred entertainment. This real life conflict situation is a 2-person, non-zero sum game in which communication is allowed. If Player 1 announces that he plans to choose a_1 and that no arguments would alter his choice, and if Player 2 has faith in 1's stubbornness in sticking to his announced intentions, then she has no alternative but to choose b_1 . A similar argument holds if 2 announces her intentions first. Thus, it may be seen that it is sometimes advantageous in such a situation to disclose one's strategy first and to have a reputation for inflexibility. However, with some women such a unilateral procedure may be resented sufficiently to alter drastically the utilities involved in the payoff matrix.

One should note that in the matrix in Fig. 3, the choices a_1 , b_1 and a_2 , b_2 are equilibrium pairs (each has more to lose than to gain by unilaterally shifting to another decision). If no preplay communication is allowed and each becomes aware of the other's decisions simultaneously, Player 1 may reason as follows: "I want a_1 , b_1 and clearly my opponent prefers a_2 , b_2 ; but if I take a_1 and she takes b_2 , then we both lose. Suppose, then, that I give in and take a_2 , I still will do pretty well. But Player 2 may reason the same way and give in to me, and again we would both lose with the a_2 , b_1 consequence. Whatever rationalization I give for either a_1 or a_2 , there is, by the symmetry of the matrix, a similar rationalization for Player 2,

and so it seems inevitable that we both lose." It may be probable to further assume that this is a common situation in which this man and woman find themselves; perhaps they have the problem every Saturday night. It is possible to mix the possible choices and achieve a security level (worst probable outcome) of $1/4$. The formula for determining the probable gain from a particular mixed strategy is $G = axy + bx(1-y) + c(1-x)y + d(1-x)(1-y)$.⁶ A likely mixed strategy is entered in the formula (x =Player 1's strategy and y =Player 2's strategy). In the game of the Battle of the Sexes, the utilities create a balanced matrix and one can rationally assume that Player 2's strategy will be $1-x$. If it is rational for Player 1 to play a_1 $3/4$ ths of the time, it is also rational for Player 2 to play b_2 $3/4$ ths of the time. The formula predicts the probable gain to Player 1 if both play choice 1; hence, if $x=3/4$, $y=1/4$.

$$G_1 = 2 \cdot 3/4 \cdot 1/4 - 1 \cdot 3/4(1-1/4) - 1(1-3/4)1/4 + 1(1-3/4)(1-1/4)$$

$$G_1 = -1/16$$

It is possible to graph the various win probabilities as in Fig. 4 so that the strategy with the greatest win probability is visible.

If communication is allowed in the Battle of the Sexes game matrix, the players will each attempt logically to improve their individual payoffs through negotiation and compromise. A two-dimensional diagram, in which the horizontal axis represents Player 1's payoffs and the vertical axis represents Player 2's

⁶Rapoport, Two-Person Game Theory, pp. 145-157.

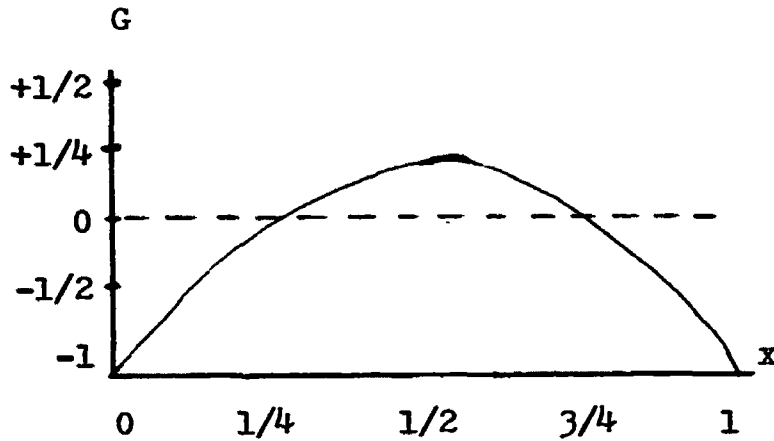


Fig. 4.--Non-Negotiated Win Probabilities in Battle of the Sexes Game

payoffs, can be drawn depicting the possible payoffs to each player (see Fig. 5).⁷ By allowing communication between the two

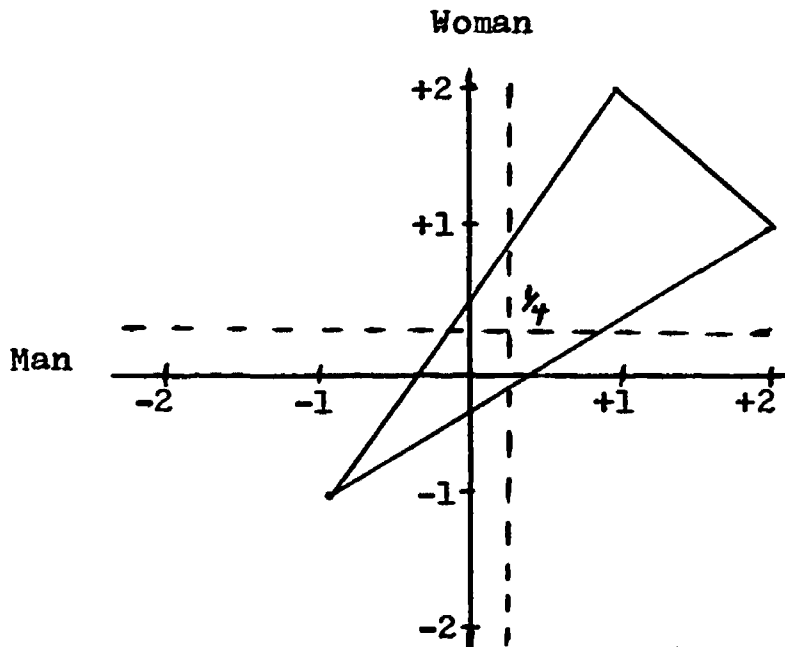


Fig. 5.--Negotiation Set for Battle of the Sexes Game

players, they are able to coordinate their choices so that their security level is 1. Coordination of the players' choices will

⁷Ibid., pp. 94-104.

reduce or eliminate the probability of the outcomes a_2 , b_1 and a_1 , b_2 and therefore both players will win at least 1 on each play; and if perfect coordination is achieved, the negotiated settlement will be $1\frac{1}{2}$.

Rationally, a player need not accept any negotiated payoff which is less than his security level for a non-negotiated game, for he can get that much without the cooperation of the other player. A vertical and horizontal dotted line is drawn through the intersection of the two security levels. These lines will intersect the boundary of the payoff polygon in some pair of points. Then the negotiation set must clearly be included between these two points. Sometimes the whole boundary of the polygon will be the negotiation set and sometimes only part of it, as shown in Fig. 5. At any rate, every point on the negotiation set must satisfy the following two conditions: (1) the players should not be able to improve their payoffs jointly from any such point, and (2) the coordinates of the point must not represent payoffs smaller than the corresponding security levels of the two players. The point within the negotiation set the players agree upon is determined by the individual circumstances and personalities involved.

3rd-Person Game Theory

The previous discussion explains the approximate limits of traditional game theory's ability to resolve a particular conflict decision. Solutions are generally described as negotiation sets or groups within which a solution may be found for a particular

situation. The investigator considered that additional progress might be possible if another kind of game were defined, one other than two-person and N-person games. Virtually all conflicts that occur in organizations are two-person conflicts. They may originally be N-person, but through negotiations and coalition formation usually evolve into two-person games. Hence, when the conflict reaches the administrator charged with resolving that particular category of conflict, he is faced with a different kind of two-person game. He is not a party to the game; he neither wins nor loses unless it could be said that he wins if the conflict is bounded or ended, and he loses if the conflict remains unbounded. Therefore, he is a third person in a two-person game. In a 3rd-person game, there is a typical two-person game matrix but the parties involved no longer have the privilege of making decisions. The administrator makes the decision which affects the outcome of the game and the winning or losing of the two original participants. He must not form a coalition with one of the players, as this would alienate the other player and the conflict would not be bounded. The 3rd-person game matrix is described in Fig. 6.

		Player B	
		Yes	No
Player A	Yes	+x,+y	1,-1
	No	-1,1	-1,-1

Fig. 6.--3rd-Person Non-Zero Sum Game Matrix

In the 3rd-person matrix the utilities in outcomes b, c, and d are arbitrary because in real life the utilities would be determined by the players involved and would generally be unknown to the administrator. But the positive and negative signs would be true regardless of the size of the absolute number. The only outcome in which both of the players could be winners is outcome a.

The utilities in outcome a are those of the administrator and how he views the situation. To arrive at his utilities the administrator must first break the conflict down into its component issues and assign to each of these a utility based upon his values. The decision maker's values will be stated in terms of his level of agreement and disagreement with the issues involved. His agreement or disagreement will usually be qualified. In other words he agrees generally with issue x but there are times when he can visualize possible disagreement. A typical issue today could be accountability; an individual may be generally in favor of accountability but he knows there are times when accountability is impractical. Another issue may be academic freedom; he may agree but he may also feel that there are times when the privilege of academic freedom is abused. The investigator feels that there are very few issues which an individual would see as clearly black or white, completely agree or completely disagree. The following table is one which has been devised to reflect relative levels of agreement and disagreement:

7. Completely Agree - No possible exception
6. Strongly Agree - Very few exceptions
5. Generally Agree - Some exceptions
4. Neutral - Agree in as many cases as disagree

3. Generally Disagree - Some exceptions
2. Strongly Disagree - Very few exceptions
1. Completely Disagree - No possible exception

After the administrator has analyzed the conflict situation for its component issues and assigned to them the utilities on the above rating scale, he will then average them. For example:

issue x = 6	
issue y = 2	Ratings Phrased for Player A.
issue z = 5	
total: 13	
average: 4.33	

The issues must be so arranged to reflect one of the conflicting player's viewpoint. If the conflict involves innovation in the classroom, the value of job experience and supporting a staff member, the issues for one side of the conflict could be stated as:

1. I am in favor of classroom innovation: utility = x
2. I place little value on job experience: utility = y
3. I should support my staff member: utility = z

In this instance the composite utility for the side favoring innovation, placing little value on experience, and supporting my staff member, would be $x + y + z$ divided by 3, and the utility of the side placing little value in innovation, favoring experience, and not supporting my staff member, would be $7-x + 7-y + 7-z$, all divided by 3. By using this procedure with the previous example of utilities of 6, 2, and 5, the matrix shown in Fig. 7 was produced. The administrator's duty would then be to verbalize a decision reflecting the composite utilities.

		Player B	
		Yes	No
Player A	Yes	4.33, 2.66	1, -1
	No	-1, 1	-1, -1

Fig. 7.--Matrix Showing Utility Relationship
Between Players A and B

Procedure.--The steps followed in arriving at a decision using 3rd-person game theory are:

1. Determine if the conflict is a game situation.
(Are there already rules or procedures to handle this situation?)
2. Analyze the conflict for decision issues.
3. Apply the utility rating scale.
4. Place the results of No. 3 in a 3rd-person game matrix.
5. Make a decision reflecting the utilities in the matrix.

The decision which the administrator, acting as the third person, makes should reflect, as much as possible, positive utilities for each person in the conflict. The size of the plus factor will be determined by the value analysis at which the decision maker arrives in making the decision. The individuals in the conflict will be assumed rational, that is, they will prefer the positive reward that they are offered by the administrator rather than risking a prolonged conflict in the hope of an even greater reward. The administrator must plan his strategy

so his decision is presented in a manner which provides the greatest probability of acceptance on the part of the conflicting parties. He may decide that it will be best to use his status authority and simply announce his decision without any communication between the opposing factions; or he may determine that a maximum amount of communication will be the best route to follow, and therefore he will bring all parties together to discuss the conflict. The administrator's ultimate goal remains unchanged regardless of whether he chooses one of the two methods mentioned or some other strategy: the ending or bounding of the conflict.

Experimental Design

The experimental design used in this study was three randomized groups selected from two sources, graduate students at the University of Oklahoma with at least two years of public school administrative experience and graduate students at the same institution with no administrative experience of any kind. The three groups were limited to individuals with master's degrees. Group one consisted of the graduate students with administrative experience. Groups two and three were graduates with no administrative experience. Only group three received the primary treatment effect, namely instruction in 3rd-person non-zero sum game theory. All three groups were administered the conflict decision-making test developed as a part of this study.

As a check on the accuracy of the scoring method of the test instrument, group one was assumed to be identical with groups two and three. The variable manipulated was the experience

variable which was viewed as the treatment effect for group one. If the test instrument failed to measure decision-making ability, there should have been no differences between groups one and two. If the treatment effect that group three received did in fact duplicate practical experience, then there should have been no differences between groups one and three. If the treatment effect that group three received produced an increase in decision-making ability, there should have been a difference between groups two and three (see Fig. 8).

Group 1	Experience	No instruction	test
Group 2	No experience	No instruction	test
Group 3	No experience	Instruction	test

Fig. 8.--Experimental Design

The differences between the groups were determined by planned comparisons in an analysis of variance test. The study was not concerned with the question of whether or not anything occurred in the experiment--a question which would be decided by the overall F test. Rather, the study was concerned with the differences that occurred between group one and group two and the differences between group two and group three. The level of significance for each comparison was .05. The sample size was set at 24, with a cell size of 8. The sample size was arrived at by calculating a power of .90 to detect a difference of $1\frac{1}{2}$ standard deviations at the .05 level.

Method

Six conflict situations were developed (see Appendix I). The situations were taken as typical conflict situations in which

a school administrator frequently finds himself. The issues represented conflict between teachers, teachers and students, teachers and parents, and teachers and administrators.

Each of the six conflict situations were examined for value issues which are listed in Appendix II. Typical issues were academic freedom, innovation, class size, support of teacher, intra-faculty responsibility, and role of a supervisor. The issues were administered to each individual before he had completed the decision test. The subjects scaled the value issues according to their personal values. Experienced administrators were expected to have values which they had found to be essential in their conflict decision-making procedures. It was assumed that they arrived at these values through their experiences in conflict situations. Third-person game theory was assumed to describe the process followed by these administrators. The scale used was the one developed with 3rd-person game theory earlier in this study. A score of 1 represented total disagreement and a score of 7 represented total agreement. The decision-making test was the six conflict situations in Appendix I with a blank space after each for the subject's decision. Each individual's score was determined by the degree of agreement between the subject's responses to the decision situations and his responses to the value issues. Each individual also received a numerical score determined by the scoring instrument developed in Appendix III.⁸

⁸Felix M. Lopez, Jr., Evaluating Executive Decision Making: The In-Basket Technique (USA: American Management Association, Inc., 1966), pp. 85-119.

Error variability was controlled by randomizing the assignment to groups two and three. Only male subjects were used, as sex might have affected the results and the vast majority of administrators are male. Due to the limited sample populations, limited external validity was anticipated; however, strong internal validity was expected.

The reliability of the decision-making test instrument was determined by the split half method.⁹ The major function of group one was to further substantiate the reliability of the test instrument.

⁹N. M. Downie and R. W. Heath, Basic Statistical Methods (New York: Harper & Row, Publishers, 1965), p. 220.

CHAPTER II

REVIEW OF THE LITERATURE

The scheme that was followed in this review was to first examine the notion of conflict in organizations; secondly, the concept of value was explored; and thirdly, the term utility was developed. Finally several decision models or theories were examined in relation to these three concepts: conflict, value, and utility.

"Decisions under conflict" is the phrase Miller and Starr used to describe the decision problems involving conflicting interests.¹⁰ The authors applied their notion of conflict to a manager and competitor situation. A matrix was constructed which contained the payoff or utility for the manager for each possible outcome.

	Opponent's Strategies			
	C ₁	C ₂	C ₃	C ₄
Manager's S ₁ :	0.6	-0.3	1.5	-1.1
Strategies S ₂ :	0.7	0.1	0.9	0.5
S ₃ :	-0.3	-0.0	-0.5	0.8

Source: David W. Miller and Martin K. Starr, The Structure of Human Decisions (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), p. 129.

¹⁰David W. Miller and Martin K. Starr, The Structure of Human Decisions (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), pp. 127-137.

The key to this notion of conflict resolution was that there was no unknown information. Hence, the manager was able to construct a complete matrix using the available information to arrive at the payoff, which was in this situation either gains or losses in the manager's organization's share of the market. If he could arrive at a complete matrix, then he had to assume that his opponent was rational, had the same information available, and could arrive at the same conclusions; therefore, the manager had to make his decision in light of the probable action of his competitor. While it was not necessarily a simple task to select the correct strategy, the decision maker's task was lessened by having all of the information available. The type of conflict situation in which an administrator frequently finds himself often has very little information available. Hence, this sort of decision theory would prove of little value.

March and Simon defined conflict as "a breakdown in the standard mechanisms of decision making so that an individual or group experiences difficulty in selecting an action alternative." They further identified three classes of conflict: "(1) individual conflict; (2) organizational conflict; (3) interorganizational conflict."¹¹ The area of primary concern was organizational conflict. March and Simon identified two categories of organizational conflict: individual conflict within an organization and intergroup conflict within an organization. Accordingly, an organization reacted to conflict by problem-solving,

¹¹James G. March and Herbert A. Simon, Organizations (New York: John Wiley & Sons, Inc., 1958), pp. 112-135.

persuasion, bargaining, and politics. The decision maker using this approach would first determine which class of conflict the situation represents, which category, and then select the correct reaction with which to bound the conflict.

Conflict was defined by Rhenman, Stromberg, and Westerlund "as a breakdown in or a threat to cooperation." The authors identified three kinds of decision-making conflicts: formal decision conflict, substantial decision conflict, and pseudo-conflict. One unusual point that the authors proposed about conflict situations was that they are very seldom brought out into the open. They alluded this phenomenon to unwritten norms within an organization which identified conflicts as undesirable behavior and to be avoided. "Only as a last resort are conflicts taken to a superior for solution. Even then they are often presented in a socially acceptable guise."¹² While this may be true, if the conflict remained unbounded at a lower level, an administrator would most certainly become cognizant of the problem and would be compelled by the organization to find a solution.

Blau and Scott related conflict to change in that there was a direct cause and effect relation: one caused the other. "Changes in the social structure often precipitate conflict, and conflicts tend to generate innovations."¹³ The authors were particularly interested in the relationship as it occurred in bureaucratic organizations' line and staff arrangements. The changes

¹²E. Rhenman, L. Stromberg, and G. Westerlund, Conflict and Co-operation in Business Organizations (London: John Wiley & Sons, Ltd., 1970), pp. 64-70.

¹³Peter M. Blau and Richard W. Scott, Formal Organizations (San Francisco: Chandler Publishing Company, 1962), pp. 240-242.

that came about as a result of conflict were mitigating forces that naturally occur. The changes were new response patterns that replaced old patterns that for some reason no longer functioned properly. Bureaucracies have been recognized as the epitome of stability; therefore, the personnel that have been part of a bureaucracy are those who prefer stability to fluidity in their social structure. Change in the social structure provoking conflict would then naturally follow.

Another author that took a sociological approach to conflict in organizations was Dalton. He viewed the relationship between the members of management as a "general conflict system." Dalton felt that this conflict system was caused and perpetuated primarily by:

- (1) power struggles in the organization stemming in the main from competition among departments to maintain low operating costs; (2) drives by numerous members to increase their status in the hierarchy; (3) conflict between union and management; and (4) the staff-line friction....¹⁴

The author contended that the aura of conflict was not only unaccounted for in the organizational plan, but was in fact in contradiction to the organizational goals. All members of the management team were a party to the conflict system. Because the conflict was real and formally unacceptable, it had to be hidden which resulted in an intensification of the level of conflict.

¹⁴Melville Dalton, "Conflicts Between Staff and Line Officers," in Organizations: Structure and Behavior, ed. by Joseph A. Litterer (New York: John Wiley & Sons, Inc., 1969), pp. 397-406.

In addition to describing functions of supervision, coordination, and control, the organizational plan was viewed by Etzioni as also providing "points at which conflicts can be resolved." The reason that these points were involved in conflict resolution was, according to the author, an important element in the organizational scheme. "Providing for any two employees and for any two organizational units, one point of authority to which both are subordinate and at which conflicts can be settled is viewed as essential to organizational efficiency."¹⁵

An author who dealt with the points of conflict resolution which Etzioni discussed is Griffiths. Three occasions for decisions: intermediary decisions, appellate decisions, and creative decisions, were labeled by Griffiths. The second, the appellate decisions, are ones which are referred to the administrator by his subordinates for a number of reasons. The cause of the appellate decisions may be as a consequence of incompetent subordinates, novel situations, incompetent superiors, and conflict between two or more subordinates. "The number of appellate decisions an executive is called upon to make is an indication of an organization's state of health."¹⁶

Dutton and Walton examined two approaches of conflict resolution. One approach was labeled the bargaining approach. This

¹⁵Amitai Etzioni, Modern Organizations (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964), p. 27.

¹⁶Daniel E. Griffiths, "Administration as Decision-making," in Administrative Theory in Education, ed. by Andrew W. Halpin (Chicago: University of Chicago, 1958), pp. 144-147.

method emphasized that with respect to goals and orientation to decision making, "each department emphasized the requirements of its own particular task, rather than the combined task of the plant sales district as a whole." The other method studied was the problem-solving approach. This approach "stressed common goals whenever possible and otherwise sought to balance goals... stressed the existence of superordinate district goals and the benefits of full collaboration for each party."¹⁷ The results that Dutton and Walton found were that the bargaining approach produced attitudes in support of their own strategy while the problem-solving approach produced positive, inclusive and trusting attitudes regarding other departments.

An argument proposing that "most organizations most of the time exist and thrive with considerable latent conflict of goals" was proposed by Cyert and March. They wrote that at the level of operational objectives there was no internal consensus. Their conclusions were "that conflict is resolved by using local rationality, acceptable-level decision rules, and sequential attention to goals."¹⁸ The authors felt that whether or not the system they proposed would resolve conflict depended largely upon the actual decisions generated by the system which should have been consistent with each other and with the external environment.

¹⁷John Dutton and Richard Walton, "Interdepartmental Conflict and Cooperation: Two Contrasting Studies," in Organizations: Structure and Behavior, ed. by Joseph A. Litterer (New York: John Wiley & Sons, Inc., 1969), pp. 407-422.

¹⁸Richard M. Cyert and James G. March, A Behavioral Theory of the Firm (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963), pp. 117-118.

Diesing differentiated value-conflict decisions from economic decisions by stating that value-conflict decisions did not have a fixed number of alternatives from which to choose and the total number of possible courses of actions in value-conflict decisions were endless. "...problems of value conflict are characterized both by fluidity and by conflict, disorganization, or disintegration." As a result of value conflict, the author felt that the resulting decisions were about the direction and order of changes. To accomplish the changes that the value conflict required for resolution, three principles of decision making were proposed:

The easiest possible relevant changes should be selected; select a problem area that is independent enough from its context to sustain a separate solution against outside pressures; one should begin a solution in such a way that expansion of the solution is possible.¹⁹

An opposing point of view was held by Brown. He suggested that "organizational conflict seldom is a matter of conflict of values."²⁰ He felt that people join and remain with an organization because they have more values in common with it than with any other organization available. Conflict occurred not as a result of different values but as a result of different opinions as to the means of implimenting them. The favoring of different means to achieve the same value was due to differing priorities, different responsibilities, and differing knowledge of available

¹⁹Paul Diesing, "Noneconomic Decision-Making," in Organizational Decision Making (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1967), pp. 185-200.

²⁰Ray E. Brown, Judgment in Administration (New York: McGraw-Hill Book Company, 1966), p. 101.

information.

"All decision making involves values" was the central theme in a book sponsored by the Cooperative Program in Educational Administration. And so any decision, whether economic or non-economic, requires the decision maker to choose from among several alternatives to which he "applies some standard of values, some judgment of right and wrong, of good and bad."²¹ The commitment to the basic values of our democratic society were considered essential to any decision making. Furthermore, the commitment had to be an active rather than a passive one.

Simon defined decisions as being of a factual nature or of a value nature. "In so far as decisions lead toward the selection of final goals, they will be called 'value judgments'; so far as they involve the implementation of such goals, they will be called 'factual judgments.'" Separating the goals involved in a decision into clean categories of implementation and selection was often very difficult. However, Simon indicated that this difficulty may be lessened by measuring the alternatives found in a decision situation and arranging them according to an index. "These value-indices involve an important factual element, for they presuppose that an alternative characterized by a high value-index will possess a correspondingly high value."²²

²¹Decision-Making and American Values in School Administration (New York: Teachers College, Columbia University, 1954), pp. 9-13.

²²Herbert A. Simon, Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization (New York: The Macmillan Company, 1961), pp. 5, 75.

A supporting viewpoint was taken by Boulding, in that he also felt that values could and should be ranked. "A value index, like money or money's worth, is a 'measure of value,' that is, it is a set of numbers arrived at by some well-defined process, which has the property that the higher the number, the higher the value of the state of the social system from which it is derived."²³ It was difficult for the value index to maintain a 1 to 1 ordinal relation between it and the value function. The difficulty usually arose when human emotions overrode objective judgment. Boulding pointed out that a danger to ranking values was the possibility that the objective quantitative measures would cause the decision maker to view subordinate goals as being primary goals.

Kinds of values were defined by White. "Three different kinds of value were found to be important in problem solving which we term 'decomposable,' 'indecomposable,' or 'partially decomposable,' and their treatment must be different."²⁴ Whether or not a value was decomposable or indecomposable or somewhere inbetween was determined by its consequences. If the value was indecomposable, then it was assumed that it had no consequences. If the consequences had uses, then a value was valued for the use to which it might be put. The limit of the decidability of any problem situation was determined by the extent to which the

²³Kenneth E. Boulding, "The Ethics of Rational Decision," in Management: A Decision-Making Approach, ed. by Stanley Young (Belmont, California: Dickenson Publishing Company, Inc., 1968), p. 93.

²⁴D. J. White, Decision Theory (Chicago: Aldine Publishing Company, 1969), pp. 133-134.

indecomposable elements could be identified and measured.

Another notion that must be dealt with is the concept of utility. Fouraker proposed a novel viewpoint by relating utility to aspiration. He proposed that a set of solutions to a conflict situation be outlined on a continuous von Neumann-Morgenstern utility function curve and that the level of aspiration of the individuals involved be plotted upon the curve. The level of aspiration was that point on the utility scale that represented the minimum acceptable level, anything lower and the individual would refuse the solution and the conflict would continue.²⁵

Coombs attempted to describe a hypothetical setting in which the utilities of the individual members of a society would merge to obtain a social choice. Individual utility measures had to be measured, particularly measures between individuals. In defining social choice, two value judgments had to be considered: "the relative weight to be assigned to each individual in the society and the relative weight to be given to each preferential vote."²⁶ Of critical importance was the weighting of each preference by its strength. The weighting could not be done absolutely but rather relatively, one in relation to another.

A decision model based upon the probability of any event's occurring and the conflicting values that are found in the

²⁵Lawrence E. Fouraker, "Level of Aspiration and Group Decision Making," in Decision and Choice: Contributions of Sidney Siegel, ed. by Samuel Messick and Arthur H. Brayfield (New York: McGraw-Hill Book Company, 1964), pp. 203-204.

²⁶R. M. Thrall, C. H. Coombs, and R. L. Davis, eds., Decision Processes (New York: John Wiley & Sons, Inc., 1954), pp. 69-86.

decision situation was developed in a study by Bross. When a problem had more than one probable outcome, the result was determined by averaging the desirability of the several outcomes. The model described by Bross had as input data which entered both a predicting system and a value system, both of which affected the decision criterion ending with the recommended solution.²⁷

Alexis and Wilson defined two kinds of decision models: closed and open. "...closed to describe the classical situation where a decision maker faces a known set of alternatives and selects a course of action by a rational selection process. Open often incorporates adaptive or learning features."²⁸ The authors wrote that the most commonly used and accepted model for decision making in organizations was the closed decision model. The open decision model assumed that the decision maker could not recognize all goals and feasible alternatives.

The great need for the analysis of decision problems by a testable model was pointed out by King. "In using a decision model, the scientific analyst makes assertions that express the relationship of various elements of the system with each other and, in turn, their effect on the outcome of the decision situation."²⁹ The model, therefore, represented in miniature the

²⁷Irwin D. J. Bross, Design for Decision: An Introduction to Statistical Decision-Making (New York: The Free Press, 1953), pp. 26-32.

²⁸Marcus Alexis and Charles Z. Wilson, Organizational Decision Making (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), pp. 148-163.

²⁹William R. King, Probability for Management Decisions (New York: John Wiley & Sons, Inc., 1968), pp. 18-19.

total system. The author proposed that after the model was developed, it could be experimented upon and then the effects that appeared to affect the model could be assumed to affect the total system in a similar manner.

A social system model developed by Getzels pointed to three principal sources of conflict in an organization: role-personality conflict, role conflict, and personality conflict.

Role personality conflicts occur as a function of discrepancies between the pattern of expectations attaching to a given role and the pattern of need-dispositions characteristic of the incumbent of the role.

Role conflicts occur whenever a role incumbent is required to conform simultaneously to a number of expectations which are mutually exclusive, contradictory, or inconsistent, so that adjustment to one set of requirements makes adjustment of the other impossible or at least difficult.

Personality conflicts occur as a function of opposing needs and dispositions within the personality of the role incumbent himself.³⁰

Getzels felt that the conflict found in an organization was a symptom of administrative failure and as a consequence there was a reduction in individual and institutional production.

³⁰Jacob W. Getzels, "Administration as a Social Process," in Administrative Theory in Education, ed. by Andrew W. Halpin (Chicago: University of Chicago, 1958), pp. 161-162.

CHAPTER III

DESIGN OF THE STUDY

The purpose of this study was to develop and test a model describing the decision-making procedure used by an administrator to deal with internal conflict situations. The model developed was labeled 3rd-person non-zero sum game theory. This model made use of conventional game theory definitions and techniques but the decision-making power was removed from the immediate participants and reserved for the administrator to whom the conflicting parties reported. By using game theory terms and definitions, the model lent itself to a degree of quantification which is lacking in other decision models. Because the model was quantifiable, the second purpose of the study was possible: the testing of the model.

The experimental design of this study consisted of three groups arranged so that planned comparisons in a one-way analysis of variance statistical technique could be used. Each group was made up of eight individuals for a total experimental group of twenty-four. For the purpose of administrative control, group one was numbered one through eight, group two was numbered eleven through eighteen, and group three was numbered twenty-one through twenty-eight. Group one was made up of male graduate students at the University of Oklahoma who had secondary school

administrative experience. Groups two and three were made up of male graduate students at the same institution; they differed from group one only on the experience factor. The individuals in groups two and three were randomly assigned to one or the other of the two groups. Group three was the only group to receive the primary treatment effect of instruction in 3rd-person non-zero sum game theory. All three groups were considered to be equal except that group one had secondary school administrative experience, and group three had received instruction in 3rd-person non-zero sum game theory. The principal purpose of group one was to serve as a check upon the reliability of the conflict decision test instrument developed as a part of this study. In other words, if the test instrument could discriminate between groups one and two, then it was measuring the effect of experience upon the decision-making ability of the subjects. Any difference that the test indicated between groups two and three was assumed to be the direct result of the effects of the primary treatment effect.

The procedures used to administer the test was identical for all three groups. Each subject was given the value issue instrument and asked to complete the two pages, being as accurate as possible. Upon completion of the value issue instrument, it was collected and each subject was given the decision situation test. The instructions were for each individual to resolve each conflict situation to the best of his ability, being as thorough and complete as possible. The starting time was recorded and the subjects proceeded through

the six situations at their own pace. As each completed the decision test, the time was recorded. The only variation in the above procedure was that group three received ten minutes of instruction on 3rd-person non-zero sum game theory before responding to either the value issue instrument or the conflict decision test. Essentially the material covered in the instructions for group three were identical to the description of 3rd-person non-zero sum game theory found in Chapter I of this study.

Scoring

Scoring of the conflict decision tests was done by using the conflict decision score sheet developed as a part of this study (Appendix III). The decision tests completed by the subjects were randomly mixed and then were scored by decision. In other words, the decisions for conflict situation number one were all scored before anyone's decision for conflict situation number two was scored. This procedure was intended to reduce investigator bias and to achieve standardized scoring results. Each decision was scored on ten categories: (1) game considerations; (2) value issues (differences); (3) values considered; (4) decision appropriateness; (5) involvement; (6) sensitivity; (7) dependency; (8) decisiveness; (9) leadership; and (10) output. An eleventh scoring category was the amount of time the subject had taken to deal with all six decisions in the conflict decision test. Therefore, each subject generated eleven scoring categories. The results of the eleven scoring categories

for each subject can be found in Appendix IV.

Achieving objective scores from subjective material was quite difficult. Each subject's response to each of the six conflict situations was a decision which he felt would resolve whatever conflict that was present. The scoring of each decision was hypothesized to give some indication of the success probability of the decision maker in an actual conflict situation. As it was patently obvious that a determination of rightness or wrongness of an administrator's decision could only be determined by the passage of time, the numerical score that was assigned to each decision was only an indication of success probability.

In order that objective scores might be realized, six major categories were labeled, some of which were further divided for a total of 11 scoring criteria. Categories were used which consisted of criteria sufficiently objective to enable the scorer to examine each decision and determine their relative presence or absence. The score assigned to each category was determined by the presence or absence of the criteria used in each category.

Game consideration, the first major category, was made up of five parts. Each of the parts was in the form of a question with the answer yes signifying the presence of the criteria and the answer no signifying the absence of the criteria in question. A decision which completely utilized a game theory approach would contain all five of the criteria.

"Did the decision maker refuse to form a coalition?" was the first question asked of the decision. If the subject indicated that one of the conflicting players was right or wrong and he aligned himself in that respect, then he did form a coalition with one player against the others and the score sheet was marked "no." If the decision maker appeared to strike a personal position between the demands of the players, the subject was considered to have refused to form a coalition and the score sheet was marked "yes." Determining whether or not the subject formed a coalition was not difficult.

The second question asked of the decision was whether or not a non-zero situation was maintained. If the decision seemed to give in to one player's demands against the other player, then a non-zero situation was not maintained and the score sheet was marked "no." There is some similarity between this question and the first question; however, it was possible to differentiate between the two questions. In determining whether or not a coalition was formed, the investigator looked for statements which reflected the personal position of the decision maker. The second question asked: "Did the decision compromise the demands of the players or give in to one or the other?" It was found that the decision makers frequently made decisions which received "yes" marks for the first question and "no" marks for the second question and vice versa.

"Was the rationality of the players considered?" was the third question asked in the game consideration scoring category. This question attempted to determine if the subject

considered what type of decision the players would accept. If it was apparent from the decision that the decision maker was considering what the players would accept as a minimum, the score sheet was marked "yes." However, if the subject appeared to be ignoring the players' demands completely, then the score sheet was marked "no."

The fourth question: "Was a strategy apparent in the decision?" was somewhat similar to the third question. The difference between the two questions is that rationality considers what the players will accept as a decision and strategy is how the decision maker intends to present the decision so that the players will be more likely to accept his decision. By strategy, the decision maker considers how to present the decision in its best light so that the rationality of the players will prevail and the conflict will be bounded. The determination of the presence or absence of strategy was made by looking for words or a phrase which indicated that some consideration was being given to how to present the decision. If the subject simply laid out a decision with no mention of how he would implement it, the score sheet was marked "no." On the other hand, if the subject indicated some sequence of steps or manner of presentation, the score sheet was marked "yes."

The final question asked of the decision by the scorer was whether or not communication was encouraged. If the decision had indicated that the decision maker would attempt to arrange for some means of communication between the two conflicting parties, then the score sheet was marked "yes." If

the subject did not indicate by means of arranging or suggesting a conference between the two players, nor did he signal by any other means the desirability of the conflicting players' communicating with each other, the score sheet was marked "no." It was not necessary for the subject to indicate whether he would or would not be at the meeting of the two players; it was only necessary for him to determine whether or not he would encourage communication between them.

Value Issues was the title of the second scoring category. This category's purpose was to determine how closely the decision reflected the decision maker's values. From a total pool of seventeen value issues, each decision situation contained two, three, or four value issues for a total of nineteen measured issues. As mentioned earlier, each subject completed the value issue instrument before dealing with the decision test. However, in attempting to reduce investigator bias in scoring the values found within each decision, the investigator determined the numerical designator of the value issue as the subject implied his feelings in the conflict decision before noting the subject's own response about the value issue found on the value issue instrument. The sequence followed in scoring each decision was to first note the value issues involved; secondly, to determine from the decision the apparent feelings of the subject toward the value and record the corresponding numerical designator; thirdly, to record the subject's response to the particular value issue; and finally, to note the difference between his response on the value issue

instrument and his apparent feelings found in the decision. The larger the total difference, the greater the disparity between what he said he believed in and what he actually practiced.

The third scoring category, judgment, contained two scoring considerations. The scoring considerations deliberated within this category were both in the form of questions. "Were the values considered?" was the first question asked of the decision. In scoring this question, the investigator examined the decision for any indication that the decision maker had consciously considered any of the pertinent value issues. This question was scored rather generously; if there was any indication at all that any of the value issues were considered, the score sheet was marked "yes."

"Was the action taken appropriate?" was the second of the two questions in the third scoring category. This question called for an opinion on the part of the investigator, who relied upon his own administrative experience to determine if the decision was appropriate to the circumstances of the situation. This question was considered with a very open mind; if the decision was in any way appropriate, the score sheet was marked "yes." If the subject completely left the realm of possibility, the score sheet was marked "no."

Style was the fourth major category; however, style per se was not scored as there were five scoring categories within this major category. Involvement of others was the first scoring category. Each conflict situation presented the subject

with a problem of how to resolve the conflict. In resolving the conflict, the decision maker had to elect to use one of five alternate levels of involvement. The subject had to do one of the following:

1. Involve both players before the decision was made.
2. Involve only one player before the decision was made.
3. Involve both players after the decision was made.
4. Involve only one player after the decision was made.
5. No involvement at all.

This scale was designed to provide some insight into the degree of involvement the decision maker felt was required to deal with the conflict situation. The key point was determining if the involvement came before or after the decision was made. "Was the subject involving the player(s) to arrive at a decision or to accept a decision?" was the critical question asked of each situation.

Within the style category sensitivity was the second scoring consideration. Sensitivity had three possible responses: (1) considerate; (2) unfeeling; and (3) undetermined. Each decision was examined for an overt indication of this aspect of the decision maker's style. If his choice of words showed an intention to be considerate or unfeeling, the score sheet was so marked. If it was not readily obvious which of the two applied, then the undetermined response was marked. If there was any doubt as to the subject's intentions, the undetermined response was marked.

The third scoring category found within the style category was dependency. There were three possible responses in this category: (1) independent; (2) dependent; and (3) undetermined. The scoring procedure for the dependency category was to examine the decision for appeals to higher authority for relief. If the subject indicated he would refer the decision to his supervisor, the "dependent" response was marked. If the subject's decision was devoid of appeals to higher authority, the "independent" response was marked. However, if the subject was vague on this point, the "undetermined" response was marked.

Decisiveness was the fourth scoring consideration in the style category. Decisiveness was scored somewhat differently than the two previous scoring considerations, in that instead of an either/or situation, there were three graduated levels ranging from implementing the decision at the earliest opportunity through some delay in implementing the decision to procrastinating. If the decision maker indicated some sort of delay by saying he would wait to talk to someone or he would arrange a conference, then he was delaying somewhat the decision and the score sheet was so marked. On the other hand, if he indicated he would take some immediate action, the first response--that of implementing the decision at the earliest opportunity--was marked. If the subject displayed a total lack of action, the "procastination" response was marked.

The final scoring consideration in the overall style category was leadership. There were three possible responses in the leadership scoring category. The three possible responses

were: (1) democratic, (2) authoritarian, and (3) undetermined. If there was any doubt in the mind of the scorer of the leadership the decision implied, the "undetermined" response was marked. If the subject dealt with the conflict situation in such a way as to consider the human rights, values, and responsibilities of the players, the "democratic" response was marked. If the subject apparently ignored the basic rights of the two conflicting players and behaved in an arbitrary manner, the "authoritarian" response was marked.

The fifth category on the conflict decision score sheet was output. This category was simply the total number of words the subject used to resolve the conflict. Counted as units of one were individual words, hyphenated words, and groups of numbers.

The final scoring category, time, was not on the conflict decision score sheet but was on the totals score sheet. The time scoring category was the total time the subject used to deal with all six decisions.

Tallying

The tallying procedure for each of the scoring factors was somewhat different. A "totals" score sheet was completed for each subject. Therefore, for each subject a separate score sheet was completed for each decision and then the totals were completed by tallying the scores for each decision by category. In other words, each subject received a score for each scoring consideration for each decision and then a total was compiled for each subject for each scoring consideration. There was no

overall score possible as the scoring considerations were not mathematically equal.

Game considerations were tallied by adding the number of "yes" marks and the total was the overall total for the six decisions. The total scores could possibly have ranged from zero to thirty. The undetermined category was rarely marked and was not considered in the calculations.

The decision maker's value issue difference scores were added to determine his value issue total score. The total score indicated the degree in which the subject deviated from what he said he believed his true feelings to be. A score of zero indicated complete consistency and the larger the score, the greater the inconsistency found in the subject's responses.

Judgment "yes" marks were added from all of the subject's six decisions to compile the total judgment scores. Again, as in scoring the game considerations, the undetermined category was not marked frequently enough to consider. There were two final scores in the judgment category. The "yes" marks for each sub-category scoring consideration were tallied separately. Hence, each subject had two scores in the judgment category: one for the number of decisions in which he considered the value issues in question and a second score for the number of decisions considered appropriate. The possible range of scores for each sub-category was zero to six.

In the general style category there were five separate scoring considerations. Involvement of others was the first

sub-category. The score of the involvement of others category for each decision was the number corresponding to the indicated amount of involvement. The total for this scoring consideration was the sum of the six decisions. Scores could have a range of from six to thirty.

Sensitivity was the next scoring consideration in the style category. Because of the frequency of times the "undetermined" response was marked by the investigator, it was necessary to average the total score. It was necessary to average rather than add so that the effect of the "undetermined" responses would be eliminated and the results would have equal weight across subjects. After averaging, the possible range of scores was from one to two. In effect, a sensitivity scale was produced. A subject scoring closer to two was considered more sensitive than a subject whose score was not so close.

Only the "independent" marks were tallied in the dependency sub-category as the frequency of marks in the "undetermined" category was insufficient to warrant averaging as was done in the previous sub-category. The possible range of scores was from zero to six.

In the decisiveness scoring consideration each possible response was added up for a total for each response. Because of the assumptions underlying 3rd-person non-zero sum game theory, the investigator felt that the critical response was the one indicating "some delay in implementation." Therefore, while the subject's total for each possible response was tallied,

only the critical response was used in the statistical calculations for this sub-category.

The sub-category of leadership was tallied in the same manner as the sub-categories of sensitivity and dependency. Again, after averaging, the possible range of scores was from one to two. This method produced another scale, a leadership scale ranging from "authoritarian" (one) to "democratic" (two).

Output scores were simply added to produce the total tally for the subjects, and the scoring consideration of time was the total elapsed time from start to finish which each subject took to complete his six decisions.

CHAPTER IV

PRESENTATION OF THE DATA

Statistical Test Results

The purpose of this study was to develop and test a decision-making model which described how decision makers made decisions in conflict situations. The conflict decision test was administered to the subjects as described earlier in the paper. Each subject's decisions were scored by the scoring instrument developed as a part of this study. The results of each individual's conflict decision test can be found in Appendix IV. The statistical test chosen was planned comparisons in a one-way analysis of variance statistical model. The data was computed and the results for each of the eleven scoring categories will be discussed in this chapter.

Each scoring category was treated separately to determine the relationship of the scores of group one and group two, hereafter referred to as comparison one, and the relationship of the scores of group two and group three, hereafter referred to as comparison two. Note that each comparison examines the relationship between the control group, group two, and the effects of the two variables, experience and instruction in 3rd-person non-zero sum game theory. The hypothesis being tested stated that there would be a difference between the scores of group one and group two, comparison one, and a difference

between the scores of group two and group three, comparison two. The statistical technique used was planned comparisons in a one-way analysis of variance model. Statistical significance was placed at the .05 level. This level of significance gave a 95 per cent degree of assurance that the findings were not random and were the results of the effects of the variables of experience or instruction.

While the primary function of group one was to establish the reliability of the conflict decision test and the associated scoring instrument, additional effort was made to determine the reliability level of the test instrument. This additional effort was in the use of the split-half test for reliability which was used upon the scoring categories of game considerations and value issues. The split-half test for reliability was not used upon the other scoring considerations as they were not arranged so as to facilitate the use of that statistical test. Nor would it have been appropriate to use any other statistical test for reliability upon the remaining scoring categories.

The eleven tables presenting the results of the statistical analysis of the data produced by the conflict decision test were arranged so as to best describe how the raw scores were distributed. The three groups were calculated simultaneously, but the salient points noted for each group were retrievable from the calculator separately. The sum is simply the total of the raw scores of each group. The mean is the average score of each group. The standard deviation of each

group was included to give some indication of the shape of the distribution curve. Also included to give an indication of the normality of the distribution curve was the range of the raw scores for each group. By knowing the standard deviation and the range, the shape of the curve was known; and by knowing the mean, the effect of the variables was easily visualized. Sum of squares and mean square within values were included because of the replicability requirement of research studies. The F score in planned comparisons is a function of the individual means and the mean square within.

As the game considerations was the most critical of the several scoring categories, it will be dealt with first. Note that on each comparison a result of $F=4.32$ or higher is considered significant at the .05 level. In each comparison the degrees of freedom were 1 and 21.

In the game considerations category (see Table I), both comparisons were significant far beyond the pre-set .05 level; in fact, both comparisons were significant beyond the .001 level of probability. Comparison one indicated significant differences between group one and group two and comparison two indicated significant differences between group two and group three. The split-half reliability test will indicate an acceptable level of reliability if $r=.70$ or higher. For the game considerations portion of the conflict decision test, the level of reliability was $r=.88$ which was well above the minimum level of acceptability.

TABLE I
GAME CONSIDERATIONS

Group	sum	mean	sd	range	ss
1	166	20.75	3.73	15-25	3542
2	105	13.1	3.72	9-18	1475
3	178	22.75	3.96	16-28	4070
Mean square within: 14.47					
Comparisons 1: F=16.18 2: F=23.14					
Split-half reliability factor: r=.88					

Comparison one of the value differences was not close to being significant at the .05 level of probability. However, comparison two was significant beyond the .05 level. The split-half reliability factor was $r=.78$, which was high enough to indicate that the value issue portion of the conflict decision test was reasonably reliable. These results are shown in Table II.

Both comparison one and comparison two in the first judgment category were significant beyond the .05 level of probability. It was interesting to note that the levels of significance for both comparison one and comparison two were nearly identical, as shown in Table III.

In the second judgment category (see Table IV), only comparison one was significant beyond the .05 level of probability and, in fact, it was significantly beyond the .01 level of

TABLE II
VALUE ISSUES

Group	sum	mean	sd	range	ss
1	242	30.25	9.88	4-42	8004
2	285	35.6	10.4	22-59	10911
3	190	23.75	3.8	16-28	4616

Mean square within: 73.57

Comparisons 1: $F=1.6$
2: $F=7.6$

Split-half reliability factor: $r=.78$

TABLE III
JUDGMENT NO. 1

Group	sum	mean	sd	range	ss
1	36	4.5	1.07	3-6	170
2	23	2.88	1.46	1-5	81
3	37	4.6	1.41	2-6	185

Mean square within: 1.75

Comparisons 1: $F=6.0$
2: $F=6.76$

probability. Comparison two was not close to being significant at the .05 level of probability.

TABLE IV
JUDGMENT NO. 2

Group	sum	mean	sd	range	ss
1	45	5.6	.52	5-6	255
2	33	4.1	1.12	2-6	145
3	37	4.6	1.19	3-6	181
Mean square within: .98					
Comparisons 1: F=9.2 2: F=1.02					

As shown in Table V, in the involvement category comparison one produced only random differences, while comparison two produced significant differences beyond the .05 level of probability.

In the sensitivity category comparison two produced significant results beyond the .05 level of probability. Comparison one was not quite significant at the .05 level of probability (see Table VI).

Both comparison one and comparison two in the dependency category produced only random differences and were not even near to any level of significance, as seen in Table VII.

The decisiveness scoring consideration produced significant results in comparison two, while comparison one produced

TABLE V
INVOLVEMENT

Group	sum	mean	sd	range	ss
1	164	20.5	5.2	14-31	3552
2	149	18.6	3.5	12-23	2861
3	191	23.8	3.8	19-30	4663

Mean square within: 18.02

Comparisons 1: F=0.8
2: F=6.0

TABLE VI
SENSITIVITY

Group	sum	mean	sd	range	ss
1	12.2	1.5	.35	1-2	19.5
2	9.95	1.24	.21	1-1.5	12.7
3	14.6	1.8	.20	1.5-2	27.0

Mean square within: .07

Comparisons 1: F=3.86
2: F=17.92

TABLE VII
DEPENDENCY

Group	sum	mean	sd	range	ss
1	46	5.75	.46	5-6	266
2	43	5.375	.74	4-6	235
3	43	5.375	1.19	3-6	241
Mean square within: .73					
Comparisons 1: F=.77 2: F=.0					

apparently random results (see Table VIII).

TABLE VIII
DECISIVENESS

Group	sum	mean	sd	range	ss
1	22	2.75	1.39	1-5	74
2	17	2.125	0.83	1-3	41
3	32	4.0	1.77	2-6	150
Mean square within: 1.9					
Comparisons 1: F=1.9 2: F=7.4					

As seen in Table IX, comparison two in the leadership category was significant to an extreme level, while comparison

TABLE IX
LEADERSHIP

Group	sum	mean	sd	range	ss
1	11.19	1.4	.315	1.0-1.83	16.35
2	9.93	1.24	.22	1.0-1.5	12.67
3	14.6	1.8	.21	1.5-2.0	26.95

Mean square within: 0.07

Comparisons 1: F=1.46
2: F=17.9

one was apparently different as a result of random effects.

Both comparisons in the output category, shown in Table X, were different as a result of random effects and were not significant.

TABLE X
OUTPUT

Group	sum	mean	sd	range	ss
1	4130	516.25	189.6	194-749	2,383,780
2	3097	387	119.5	248-573	1,298,895
3	4023	502.9	218.9	296-967	2,358,401

Mean square within: 32,713

Comparisons 1: F=2.03
2: F=1.64

Comparison one in the time category (see Table XI) was not different at any level of significance. However, comparison two was significant at the .05 level of probability.

TABLE XI
TIME

Group	sum	mean	sd	range	ss
1	313	39.1	9.45	30-59	12,871
2	257	32.1	11.6	19-49	9,199
3	403	50.4	19.76	25-75	23,033
Mean square within: 204.8					
Comparisons 1: F=0.9 2: F=6.53					

Interpretation of the Results

This chapter was concerned with the analysis of the data which tested the hypothesis of the study. The hypothesis was tested in two comparisons in each of eleven categories for a total of twenty-two comparisons. The level of statistical significance was set at the .05 level of probability. Using the .05 level of probability in twenty-two comparisons could mean that by the laws of probability, at least one of the comparisons could have indicated significance when, in fact, the differences were actually the results of random effects. However, of the twenty-two comparisons considered, there were eleven which produced significant results. And of the eleven comparisons which

indicated significance, the level of significance was very frequently well beyond the .05 level.

The first two comparisons involved game considerations. These two comparisons were by far the two most critical comparisons in the study, as they were using the principle decision theory components which formed the basis for 3rd-person non-zero sum game theory. Had the game consideration comparisons failed to prove significant, doubt could have been cast upon the validity of the test instrument. However, the results of the game consideration comparisons produced exactly the results the investigator anticipated. All of the standard deviations were within .2 of each other, which indicated that the scores were similarly distributed. For groups one and three the sum, mean, and range scores were nearly identical. Reliability was indicated as being very high by a score of $r=.88$ on a split-half reliability test.

Comparison one produced results of $F=16.18$ which was significant beyond the .001 level. Therefore, based upon the scoring factors in the game consideration category, group one was different from group two. Apparently when faced with a conflict situation, experienced administrators tend to make use of the decision-making techniques described by 3rd-person non-zero sum game theory to a far greater degree than teachers who have had no administrative experience. Comparison two produced results of $F=23.14$ which was also significant far beyond the .001 level of statistical probability. The scoring factors found in the game category detected the differences between

group two and group three. Therefore, it would appear that based upon this category in the conflict decision test, it was possible to affect the conflict decision-making techniques of the educators in group three, none of whom had any administrative experience, by providing instruction in 3rd-person non-zero sum game theory.

Reliability of $r=.88$ was found for the game consideration category by use of the split-half test for reliability. A reliability score of $r=.88$ is very high for this sort of test and gives a strong indication that the conflict decision test and its associated scoring instrument were consistently measuring the same characteristics of the subjects. The fact that the test and scoring instrument could differentiate between decisions made by persons with administrative experience and persons without administrative experience indicate that the measured characteristics were those used in making decisions to resolve conflict situations. Therefore, the conflict decision test and scoring instrument was reliably measuring the ability of the subjects to make conflict-resolving decisions.

Nearly as important to the study as the game considerations were the value issue results. It was predicted in 3rd-person non-zero sum game theory that a skilled administrator would recognize the values found within a conflict situation, appraise them according to his internal value structure, and incorporate them within his decision. A portion of this prediction was measured in the value issue section, that of the decision maker's appraising the values according to his internal

value structure and not allowing the emotions of the moment to sway his decision. The remainder of the prediction was measured in the judgment #1 category, namely whether or not the decision maker considered the values in the conflict situations.

Comparison one of the value issue category produced the results of $F=1.6$ which was not significant. The conflict decision test failed to differentiate between group one and group two. However, comparison two of the value issue category produced the results of $F=7.6$ which was significant. Evidently, the test instrument could differentiate between the subjects who had and had not had instruction in 3rd-person non-zero sum game theory.

The split-half test for reliability produced results of $r=.78$ which indicates a relatively high level of reliability. Apparently, the test was fairly consistent in measuring the same characteristics, but the scores in group one and group two tended to vary quite widely. The within group variance was indicated by the comparatively large standard deviations, 9.88 and 10.4, compared to group three's standard deviation of 3.8. Further indication of the internal variability of group one and group two was given by the range of the scores, 38 and 37, to 12 for group three. It should be noted that: (a) There was a relatively high level of reliability; (b) There was comparatively large variances within group one and group two; and (c) The mean score of group one was different from the mean score of group two in the same direction that group three was significantly different from group two. Some of these three

points will be seen again. Their relative importance will be discussed in the final chapter of this study.

The second portion of the predicted value results was contained within the first judgment consideration. Third-person non-zero sum game theory states that a skilled administrator will incorporate the pertinent values in the conflict-resolving decision. Comparison one produced results of $F=6.0$ which was significant beyond the .05 level. This result indicated that the conflict test and scoring instrument was measuring some characteristics which were found at different levels between the two groups. The critical point in this category was that by discriminating between group one and group two, the test achieved a usable level of reliability and gave more meaning to the results of comparison two. Group two and group three were different, as was indicated by the results of $F=6.76$ found in comparison two. It would appear that the test instrument could discriminate between those who had and had not received instruction in 3rd-person non-zero sum game theory.

It should be noted that in addition to all three groups' having similar standard deviations, group one and group three had nearly identical sums, means, and ranges. Instruction in 3rd-person non-zero sum game theory produced nearly identical results for group one and group three, as far as the conflict test could determine in the judgment category.

The second judgment category was intended to measure, in a general way, the appropriateness of the decision. Comparison one produced the results of $F=9.2$ which was significant well

beyond the .05 level of probability. Comparison two was not significant, $F=1.02$. The data for group two and group three were very nearly identical; they had similar means, standard deviations, and ranges. Evidently, there is no substitute for experience when it comes to making apparently appropriate conflict-resolving decisions, as group one scored higher in this category than either group two or group three. It might be noted that while comparison two was not significant, the differences between the mean for group two and the mean for group three were in the same direction in which the mean for group one was different from the mean for group two.

The involvement measurement portion of the conflict decision test found significant differences only in the second comparison. Apparently, experience was not a critical factor in this category. Group three, which had received instruction in 3rd-person non-zero sum game theory, scored considerably higher in the involvement category than did either of the other two groups. However, the mean of group one was much closer to the mean of group three than was the mean of group two. It might also be noted that the standard deviation for group one was rather large in relation to the other two groups. If the range had been the same but with a tighter distribution, comparison one might have been significant.

In the sensitivity category, comparison two was significant by a very wide margin, and comparison one failed to achieve the prescribed level of significance by .46. Again, as in the involvement category, if group one had the same range but a

tighter distribution, comparison one would probably have been significant. If the relationship of the three mean levels to one another are noticed, a trend became evident. The mean for group two was always the lowest or the highest of the three means. This means that the two variables were apparently affecting the scores. The mean for group one and the mean for group three were both either higher or lower than the mean for group two. In the sensitivity category, apparently experience increased the subject's score somewhat and instruction in 3rd-person non-zero sum game theory greatly affected the subject's score.

The dependency measurement produced only random results. Apparently, neither the experience variable nor the variable of instruction in 3rd-person non-zero sum game theory affected the subject's disinclination to ask for help with a problem.

In the decisiveness scoring category, only the variable of instruction in 3rd-person non-zero sum game theory had any apparent effect upon the scores, as only comparison two was significant. Again, as in the previous scoring categories, group two had the lowest or highest mean, in this case, lowest. Group two had a very tight distribution of scores, range = 1-3, while group one and group three had a much wider distribution of scores, group one's range = 1-5 and group three's range = 2-6. Evidently, the subjects that had not been exposed to either variable were more inclined to make snap judgments. Those who had administrative experience were somewhat more inclined to delay their decision and those who had received instruction in 3rd-person non-zero sum game theory were definitely much more

inclined to delay their decision.

Within the leadership category, comparison one was not significant while comparison two was significant beyond the .001 level. It would seem that the conflict decision test could not successfully differentiate between the subjects who had administrative experience and the subjects who had no administrative experience. However, instruction in 3rd-person non-zero sum game theory produced some striking results. The lowest score in this category for group three was equal to the highest score for group two. The internal variability of group two and group three were virtually identical, as seen in only a .01 difference in their respective standard deviations. Again, the trend of the rankings of the means is evident, as the mean of group two is the lowest of the three means. At this point in the study this trend became very pronounced and noticeably consistent, which may indicate that the ranking of the means is a true reflection of the effects of the variables and not due to random effects.

The output measurement produced apparently only random results. A statistical analysis of the data failed to indicate significance. However, the ranking of the means again finds group two at the bottom. It would appear that the amount of verbage an individual uses to deal with a conflict situation is more a matter of personal style than experience or instruction in 3rd-person non-zero sum game theory.

Time, the final scoring consideration, indicated significance in comparison two while comparison one failed to indicate

significance. Instruction in 3rd-person non-zero sum game theory did significantly affect the manner in which the subjects dealt with conflict situations as measured by the conflict decision test. However, the variable of experience failed to significantly affect the scores of the subjects in group one. While comparison one did fail to indicate significance, the ranking of the several group means again found the mean for group two at one extreme; in this case the mean for group two was the lowest of the three means.

To summarize the results, the findings for each of the comparisons by scoring category will be listed. Yes indicates significance was achieved.

Scoring Category	Comparison One	Comparison Two
Game Considerations	Yes	Yes
Value Issues	No	Yes
Judgment No. 1	Yes	Yes
Judgment No. 2	Yes	No
Involvement	No	Yes
Sensitivity	No	Yes
Dependency	No	No
Decisiveness	No	Yes
Leadership	No	Yes
Output	No	No
Time	No	Yes

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

The purpose of this study was to develop and test a model describing the decision-making procedures used by an administrator to deal with internal conflict situations. Third-person non-zero sum game theory was the label applied to the model. Conventional game theory definitions and techniques were used in the model, but the decision-making power was removed from the participating players and reserved for the administrator to whom the conflicting parties were both responsible. By using game theory terms and definitions, the conflict decision model lent itself to a degree of quantification which is lacking in other decision models. The testing of the model became possible because the model was quantifiable.

The experimental design of this study consisted of three groups so arranged that planned comparisons in a one-way analysis of variance statistical technique could be used. Each group was made up of eight individuals for a total experimental group of twenty-four. Group one was made up of male graduate students at the University of Oklahoma who had secondary school administrative experience. Groups two and three were made up of male graduate students, also of the University of Oklahoma;

these two groups differed from group one only on the variable of experience. One of the measured variables was, therefore, the experience the subjects in group one had in dealing with conflict situations. Group three only received the primary treatment effect which was instruction in 3rd-person non-zero sum game theory. The primary function of group one was to serve as a check upon the reliability of the conflict decision test instrument developed as a part of this study. If the test instrument could discriminate between group one and group two, then it was assumed to be measuring the effect of experience upon the decision-making ability of the subjects. Therefore, any differences that the test indicated between group two and group three could validly be assumed to be the direct result of the effects of the primary treatment effect: instruction in 3rd-person non-zero sum game theory.

Administration of the conflict decision test was identical for all three groups. The value issue instrument was completed and collected before the conflict situation portion of the test was distributed. After recording the starting time, each subject dealt with the six conflict situations at his own speed. As each completed their resolution of the six conflict situations, the time was recorded and the subject was through. Only the administration procedure for group three was different, in that they alone received any instruction in 3rd-person non-zero sum game theory before responding to either the value issue instrument or the conflict decision test.

Scoring of the conflict decision tests was accomplished by using the conflict decision score sheet developed as a part of this study. The completed decision tests were randomly mixed and then were scored by decision. In other words, the decisions for conflict situation one were all scored before anyone's decision for conflict situation two was scored. This procedure was chosen as the scoring method which was most likely to reduce investigator bias and achieve standardized scoring results. Each decision was scored on ten categories: (1) Game considerations, (2) Value issues (differences), (3) Values considered, (4) Decision appropriateness, (5) Involvement, (6) Sensitivity, (7) Dependency, (8) Decisiveness, (9) Leadership, and (10) Output. An eleventh scoring category was the amount of time the subject had taken to deal with all six decisions in the conflict decision test. Therefore, each subject generated eleven scoring categories.

Each scoring category was examined separately to determine the relationship of the scores of group one and group two, referred to as comparison one, and the relationship of the scores of group two and group three, referred to as comparison two. Each of the two comparisons examines the relationship between the control group, group two, and the effects of the two variables, experience and instruction in 3rd-person non-zero sum game theory.

The hypothesis that the study was designed to test was that there would be a difference between the scores of group one and group two, and a difference between the scores of group

two and group three.

The statistical results for each of the eleven scoring categories were arranged in tables. For each group the following was included in each table: (1) Sum, (2) Mean, (3) Standard deviation, (4) Range, (5) Sum of squares, (6) Mean square within, and (7) F scores for the two comparisons. The level of statistical significance was set at the .05 level of probability.

For the eleven scoring categories there were twenty-two comparisons. Of the twenty-two comparisons eleven produced results which were significant beyond the .05 level of statistical probability. The eleven comparisons which were significant were: comparison one and comparison two in the game considerations category, comparison two in the value issue category, comparison one and comparison two in the first judgment category, comparison one in the second judgment category, comparison two in the involvement category, comparison two in the sensitivity category, comparison two in the decisiveness category, comparison two in the leadership category, and comparison two in the time category.

Findings

The purpose of this study was to develop and test a model describing the decision-making procedures used by an administrator to deal with internal conflict situations. The model developed was labeled 3rd-person non-zero sum game theory. The rationale underlying this study was to attempt to determine how administrators dealt with conflict situations which require

the most difficult decisions for their resolution and then to achieve two goals with this knowledge. The first goal was to measure, in selected individuals, the ability to make conflict-resolving decisions. The second goal was to provide instruction in 3rd-person non-zero sum game theory, which was hypothesized to describe the procedures used by experienced administrators to deal with conflict situations, and effect a change in the individual's decision-making techniques in the direction of experienced administrators. Achievement of the first goal was indicated by the significance of comparison one in the eleven scoring categories; achievement of the second goal was indicated by the significance of comparison two in the eleven scoring categories.

The findings of this study indicate that the first goal was achieved. The decision-making ability of the subjects were reliably measured by the conflict decision-making test. Comparison one was significant in three of the scoring categories: game considerations, values considered, and appropriateness of the decision. Achieving significance in the game considerations category was particularly conclusive. The game considerations scoring category comparisons were the most critical in the study. They were critical because the game considerations were measuring the principle decision theory components which formed the basis for 3rd-person non-zero sum game theory. The results of the data in comparison one in the game considerations scoring category described perfectly the degree to which the decision-making ability of the subjects were measured. Further evidence

in support of this finding can be seen running through all eleven of the scoring categories. In each scoring category the means of the scores of the three groups were ranked in a consistent manner, in that group two, the control group, was always the lowest or the highest score. This ranking is noteworthy because the variables were, in eight of the scoring categories, not affecting the scores enough to achieve significance but were affecting the scores enough to produce a consistent pattern in the ranking of the means. If the mean of group two was always at one extreme of the ranking of the group's means, then it follows that group one and group two were always at the other extreme. If the two comparisons were to be significant in the hypothesized direction, such a ranking would be required.

The conflict decision test and its associated scoring did definitely discriminate in three of the scoring categories between group one and group two. It was therefore possible to rank the decision-making ability of the subjects involved in the test if the basic assumption was recognized, that the experienced administrators in group one were making conflict-resolving decisions which were more likely to bound the conflict than the decisions of the inexperienced administrators in group two. Therefore, the scores of the individuals in group two which more closely approximated the scores of group one could be expected to make better administrators, as far as resolving conflict situations, than the other individuals in group two.

The findings of the study indicate that the second goal was achieved. Instruction in 3rd-person non-zero sum game

theory definitely affected the decision-making techniques of the individuals in group three. Comparison two of the eleven scoring categories was intended to measure the relative achievement of the second goal. Comparison two was significant in eight of the eleven scoring categories. How permanent the change in decision-making strategy was for members in group three is speculation, but the investigator cannot help but believe that some permanent change was effected. If the amount and depth of the exposure to 3rd-person non-zero sum game theory was greatly increased over the very limited instruction which was given as a part of this study, the likelihood of permanent changes taking place in potential school administrators' conflict decision-making ability would be assured.

Conclusions

Conclusion 1.--The findings of this study support the conclusion that with the conflict decision test, it is possible to measure the decision-making ability of individuals. Therefore, it becomes possible for a school system to test applicants for administrative positions and then select from among them those with the greatest potential for conflict decision-making ability. The conflict decision test, of course, should never be the sole determinant for hiring or promotion, but it can provide a reliable measure of an individual's ability in one specific area.

Conclusion 2.--A second conclusion is also supported by the findings of this study. This study provides evidence that it is possible to train persons with no administrative experience to

make successful conflict-resolving decisions. Institutions which train public school administrators could better prepare their graduates if they would include in their training program instruction in 3rd-person non-zero sum game theory.

Recommendations

The analysis of the results of this study and the conclusions reached on the basis of this analysis support the following recommendations:

1. Public schools should initiate a policy of testing applicants for administrative positions with the conflict decision test.

2. Institutions which train public school administrators should include instruction in 3rd-person non-zero sum game theory in their course offerings.

3. Because of the nearness of several of the comparisons to achieving the preset level of statistical significance, further research should be done along the lines of this study but with larger groups. Increasing the size of the groups will increase the power of the statistic used to detect differences.

4. Future research should pay particular attention to the scoring categories in which both comparison one and comparison two were significant.

5. Future research should attempt to further validate the conflict decision test and its associated scoring instrument.

6. Future research should note the effect of other variables such as intelligence, sex, race, personality characteristics, and degree of experience upon the ability to make conflict-resolving

decisions.

7. Future research should examine the decision-making abilities of subjects at locations other than the University of Oklahoma.

BIBLIOGRAPHY

Articles

- Ohm, Robert E. "A Game Model Analysis of Conflicts of Interest Situations in Administration." Educational Administration Quarterly. (Fall, 1968), 75-79.
- Rapoport, Anatol; Chammah, Albert; Dwyer, John; and Gyr, John. "Three-Person Non-Zero-Sum Nonnegotiable Games." Behavioral Science. (January, 1962), 38-58.

Booklet

- Handy, Rollo, and Kurtz, Paul. A Current Appraisal of the Behavioral Sciences. Preferential Behavior, Vol. II, No. 7. Great Barrington, Mass.: Behavioral Research Council, 1964.

Books

- Alexis, Marcus, and Wilson, Charles Z. Organizational Decision Making. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967.
- Blau, Peter M., and Scott, W. Richard. Formal Organizations. San Francisco: Chandler Publishing Company, 1962.
- Boulding, Kenneth E. "The Ethics of Rational Decision." Management: A Decision-Making Approach. Edited by Stanley Young. Belmont, California: Dickenson Publishing Company, Inc., 1968.
- Bross, Irwin, D. J. Design for Decision: An Introduction to Statistical Decision-Making. New York: The Free Press, 1953.
- Brown, Ray E. Judgment in Administration. New York: McGraw-Hill Book Company, 1966.
- Cyert, Richard M., and March, James G. A Behavioral Theory of the Firm. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1963.
- Dalton, Melville. "Conflicts Between Staff and Line Officers." Organizations: Structure and Behavior. Edited by Joseph A. Litterer. New York: John Wiley & Sons, Inc., 1969.

- Decision-Making and American Values in School Administration. New York: Teachers College, Columbia University, 1954.
- Downie, N. M., and Heath, R. W. Basic Statistical Methods. New York: Harper & Row, Publishers, 1965.
- Dutton, John, and Walton, Richard. "Interdepartmental Conflict and Cooperation: Two Contrasting Studies." Organizations: Structure and Behavior. Edited by Joseph A. Litterer. New York: John Wiley & Sons, Inc., 1969.
- Etzioni, Amitai. Modern Organizations. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1964.
- Festinger, Leon. Conflict, Decision, and Dissonance. Stanford, California: Stanford: Stanford University Press, 1964.
- Fouraker, Lawrence E. "Level of Aspiration and Group Decision Making." Decision and Choice: Contributions of Sidney Siegel. Edited by Samuel Messick and Arthur H. Brayfield. New York: McGraw-Hill Book Company, 1964.
- Getzels, Jacob W. "Administration as a Social Process." Administrative Theory in Education. Edited by Andrew W. Halpin. Chicago: University of Chicago, 1958.
- Griffiths, Daniel E. "Administration as Decision-making." Administrative Theory in Education. Edited by Andrew W. Halpin. Chicago: University of Chicago, 1958.
- Hansen, Morris H.; Hurwitz, William N.; and Madow, William G. Sample Survey Methods and Theory. New York: John Wiley & Sons, Inc., 1953.
- Kerlinger, Fred N. Foundations of Behavioral Research. New York: Holt, Rinehart and Winston, Inc., 1964.
- King, William R. Probability for Management Decisions. New York: John Wiley & Sons, Inc., 1968.
- Kogan, Nathan, and Wallach, Michael A. Risk Taking: A Study in Cognition and Personality. New York: Holt, Rinehart and Winston, 1964.
- Lopez, Felix M. Jr. Evaluating Executive Decision Making: The In-Basket Technique. USA: American Management Association, Inc., 1966.
- Luce, R. Duncan, and Raiffa, Howard. Games and Decisions: Introduction and Critical Survey. New York: John Wiley & Sons, Inc., 1958.

- March, James G., and Simon, Herbert A. Organizations. New York: John Wiley & Sons, Inc., 1958.
- Miller, David W., and Starr, Martin, K. The Structure of Human Decisions. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967.
- Ofshe, Lynne, and Ofshe, Richard. Utility and Choice in Social Interaction. Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1970.
- Owen, Guillermo. Game Theory. Philadelphia: W. B. Saunders Co., 1968.
- Paterson, T. T. Management Theory. London: Business Publications Limited, 1969.
- Rapoport, Anatol. Fights, Games, and Debates. Ann Arbor: The University of Michigan Press, 1960.
- Rapoport, Anatol. Two-Person Game Theory: The Essential Ideas. Ann Arbor: The University of Michigan Press, 1966.
- Rapoport, Anatol, and Chammah, Albert M. Prisoner's Dilemma: A Study in Conflict and Cooperation. Ann Arbor: The University of Michigan Press, 1965.
- Rhenman, E.; Stromberg, L.; and Westerlund, G. Conflict and Cooperation in Business Organizations. London: John Wiley & Sons Ltd., 1970.
- Shelly, Maynard W. II, and Bryan, Glenn L., eds. Human Judgments and Optimality. New York: John Wiley & Sons, Inc., 1964.
- Shull, Fremont A. Jr.; Delbecq, Andre L.; and Cummings, L. L. Organizational Decision Making. New York: McGraw-Hill Book Company, 1970.
- Simon, Herbert A. Administrative Behavior: A Study of Decision-Making Processes in Administrative Organization. New York: The Macmillan Company, 1961.
- Thrall, R. M.; Coombs, C. H.; and Davis, R. L., eds. Decision Processes. New York: John Wiley & Sons, Inc., 1954.
- Timms, Howard L. Introduction to Operations Management. Homewood, Illinois: Richard D. Irwin, Inc., 1967.
- White, D. J. Decision Theory. Chicago: Aldine Publishing Company, 1969.

APPENDIX I

CONFLICT DECISION TEST

In each situation you are a secondary school principal. After each situation, write out your decision. Be as detailed as possible. Note all actions and all considerations.

Conflict Situation No. 1

A note delivered through the interschool routing system addressed to you (It is from the school system's supervisor (B) of Social Science programs): "George, I am having a great deal of difficulty in getting any cooperation from teacher A at your school. He says that he has had eleven years of experience and has developed a system which is superior to the new program we are adopting. As you know, the superintendent is in favor of the new program. Therefore, I would like for you to instruct teacher A to cooperate and change to the new program."

Decision

Conflict Situation No. 2

A note that appears on your desk one morning: "Mr. X, as you know, the counselor has just finished pre-enrolling for next year. I (teacher B) have been looking over the proposed schedule. It appears that I am again going to be overloaded with 180 students while the Foreign Language (French I and II; Spanish I and II) teacher will again have far fewer students (97). I ask you, is this fair? We teachers are continually being told we cannot have some equipment because of financial shortages. Is it economical to pay A a full salary to teach about one-half the students that I teach? I feel some action must be taken."

Decision

Conflict Situation No. 3

"Sir, as you may remember, I (teacher A) mentioned that a potential problem situation was developing when you assigned teacher B to my room during my planning period. As I foresaw, B does not care for my room as I feel he should. There are spitwads on the ceiling, obscene messages written on my desks, and gum wrappers scattered about the floor. The final incident is the ruination of my pencil sharpener. These incidents are most certainly not occurring while I am in my room. Some other arrangement must be made for B."

Decision

Conflict Situation No. 4

A note delivered to you from your counselor, Mrs. A:

"Dear Sir, I have encountered a problem with teacher B. As you know, we have recently been receiving a larger than normal number of transferring students. In the process of enrolling these students in classes, I have been forced to overload some classes. This situation is created by the limited number of electives available. After allowing the student to select the electives he desires, his schedule is for the most part then determined. This results in the overloading of some classes. Today I enrolled a new student in teacher B's third hour class (which is admittedly a large class, but due to scheduling difficulties, it was unavoidable). B came storming into my office and said she had brought the student back because she could not take any more students in that class. What shall I do?"

Decision

Conflict Situation No. 5

A student presents you with a note from his parents (B).
"Dear Mr. X, It has come to our attention that our child's math teacher (teacher A) has been seen regularly at a local tavern. A teacher is in a position to greatly influence young persons. We feel that not only is A setting a bad example, but he reflects poorly on the teaching profession. We therefore feel that our child should be in another teacher's class and that you should take some action toward terminating A's association with the school."

Decision

Conflict Situation No. 6

Your assistant principal left a note for you saying:

"A problem came up today in teacher A's sixth hour class. Student B was accused by "A" of talking, B denied her guilt and said she was tired of "A picking on her" and got up to leave the room. A told her to be quiet and then he grabbed her and set her back down, at which point the situation degenerated into a shouting match and A bringing B to my office. B was adamant in her innocence and A returned to his class after stating B was never to come back to his class. I called B's mother who became very angry toward A for "manhandling her daughter." B's mother said she and her husband would be in to see you at 9:00 in the morning. How do you want to handle the situation?"

Decision

APPENDIX II

VALUE ISSUES

Place the numerical score beside each value issue that most accurately describes your feelings for each issue.

7. Completely Agree - No possible exception
6. Strongly Agree - Very few exceptions
5. Generally Agree - Some exceptions
4. Neutral - Agree in as many cases as disagree
3. Generally Disagree - Some exceptions
2. Strongly Disagree - Very few exceptions
1. Completely Disagree - No possible exception

- ___ 1. I support academic freedom.
- ___ 2. Teachers have a professional responsibility toward fellow teachers.
- ___ 3. I favor innovative methods over traditional practices.
- ___ 4. I should support my staff in staff-faculty conflicts.
- ___ 5. Small advanced courses should be maintained even if they are economically unfeasible.
- ___ 6. A completed enrollment schedule which is an administrative responsibility should be changed to satisfy a teacher's request.
- ___ 7. Teachers should have a proprietary feeling toward school property in their classroom.
- ___ 8. Professional judgment of faculty members is to be respected.
- ___ 9. Problems should be kept at my organizational level.
- ___ 10. Teachers have a right to a private life.
- ___ 11. I should allow a child to change teachers at the request of his parent.
- ___ 12. I should ignore patron criticism.

- ___13. I should support my faculty members.
- ___14. Teachers have the right to refuse a student's admittance to class.
- ___15. Teachers have the right to touch a student.
- ___16. Students have a right to select electives even if it causes scheduling difficulties.
- ___17. A curriculum supervisor has no direct authority over teachers.
- ___18. Educational needs should have pre-eminence over custodial difficulties.
- ___19. Teacher discipline is better than office discipline.

APPENDIX III

CONFLICT DECISION SCORE SHEET

Individual No. ____ Group No. ____ Situation No. ____

A. Game Considerations

	<u>Yes</u>	<u>No</u>	<u>Undetermined</u>
1. Did the decision maker refuse to form a coalition?	+1	-1	0
2. Was a non-zero situation maintained?	+1	-1	0
3. Was the rationality of the players considered?	+1	-1	0
4. Was a strategy apparent?	+1	-1	0
5. Was communication encouraged?	+1	-1	0

Total: ____

B. Value Issues

Does the decision reflect the decision maker's values?

<u>Issue No.</u>	<u>Value Issue Response</u>	<u>Situation Decision</u>	<u>Difference</u>
------------------	-----------------------------	---------------------------	-------------------

Total: ____

C. Judgment

1. Were the values considered?	Yes	No	Undetermined
2. Was the action taken appropriate?	Yes	No	Undetermined

D. Style**1. Involvement of others**

Involve both players before decision made = 5

Involve only one player before decision made = 4

Involve both players after decision made = 3

Involve only one player after decision made = 2

No involvement at all = 1

2. Sensitivity

Considerate = 2

Unfeeling = 1

Undetermined = 0

3. Dependency

Independent = I

Dependent = D

Undetermined = U

4. Decisiveness

Decision implemented at earliest opportunity = D

Some delay in implementation = S

Procastinated = P

5. Leadership

Democratic = 2

Authoritarian = 1

Undetermined = 0

E. Output

APPENDIX IV

GAME TOTALS

Individual	Conflict Situation						Total
	1	2	3	4	5	6	
1.	5	2	4	4	3	5	23
2.	5	3	3	5	4	5	25
3.	2	3	5	1	2	5	18
4.	3	2	1	4	4	4	18
5.	2	2	4	2	4	5	19
6.	2	2	4	2	1	4	15
7.	5	3	4	4	4	5	25
8.	4	3	4	4	3	5	23
11.	1	2	1	2	3	3	12
12.	3	3	3	2	4	3	18
13.	2	2	5	3	1	1	14
14.	3	4	2	2	1	3	15
15.	2	1	4	0	1	2	10
16.	2	3	2	1	1	0	9
17.	2	1	1	3	1	1	9
18.	3	2	2	4	3	4	18
21.	3	2	3	4	4	4	20
22.	2	4	5	3	4	4	22
23.	4	2	5	4	2	3	20

Individual	Conflict Situation						Total
	1	2	3	4	5	6	
24.	5	4	4	3	4	1	21
25.	4	2	3	2	2	3	16
26.	5	3	4	4	4	4	24
27.	5	5	5	5	5	3	28
28.	5	4	5	4	4	5	27

VALUE SCORES

Individual	Conflict Situation						Total
	1	2	3	4	5	6	
1.	10	6	2	0	6	2	26
2.	6	8	7	3	2	3	29
3.	12	6	2	8	9	5	42
4.	7	9	9	5	9	2	41
5.	11	3	5	5	9	6	39
6.	8	4	3	2	7	5	29
7.	3	4	1	2	4	8	22
8.	2	3	3	2	2	2	14
11.	11	3	5	2	12	3	36
12.	4	5	4	10	5	4	32
13.	3	7	3	8	8	4	33
14.	5	6	5	3	10	5	34
15.	12	7	6	9	12	13	59
16.	4	4	5	5	9	8	35
17.	4	6	6	6	11	1	34
18.	7	1	5	3	1	5	22
21.	3	3	6	4	6	3	25
22.	7	1	1	3	4	8	24
23.	6	2	1	5	5	2	21
24.	5	7	2	5	5	2	26
25.	9	4	2	4	5	3	27
26.	3	5	5	3	4	3	23
27.	2	2	2	3	4	3	16
28.	5	5	3	5	4	6	28

JUDGMENT

Individual	Values Considered No. 1 (Yes)	Appropriateness No. 2 (Yes)
1.	5	6
2.	3	5
3.	5	6
4.	3	5
5.	4	6
6.	5	5
7.	6	6
8.	5	6
11.	2	6
12.	5	4
13.	5	4
14.	3	4
15.	2	4
16.	2	2
17.	1	4
18.	3	5
21.	5	5
22.	6	6
23.	6	6
24.	3	3
25.	2	3
26.	5	5
27.	5	4
28.	5	5

STYLE

Indiv.	Involvement	Sensitivity	Dependency	Decisiveness			Leadership
				D	S	P	
1.	31	1.6	6	1	5	0	1.33
2.	23	2.0	6	2	3	1	1.83
3.	17	1.5	6	2	4	0	1.2
4.	18	1.0	5	2	3	1	1.0
5.	20	1.25	5	3	1	2	1.2
6.	14	1.25	6	5	1	0	1.2
7.	23	1.6	6	3	3	0	1.6
8.	18	2.0	6	4	2	0	1.83
11.	19	1.0	5	4	2	0	1.0
12.	20	1.6	4	3	2	1	1.4
13.	21	1.5	6	5	1	0	1.5
14.	20	1.0	5	2	3	1	1.0
15.	19	1.2	6	3	3	0	1.33
16.	12	1.2	5	2	1	3	1.0
17.	15	1.2	6	4	2	0	1.2
18.	23	1.25	6	3	3	0	1.5
21.	24	1.75	6	1	5	0	1.67
22.	24	1.75	6	1	5	0	1.6
23.	25	1.6	6	2	4	0	1.83
24.	19	2.0	3	1	2	3	2.0
25.	20	1.5	4	2	2	2	1.5
26.	21	2.0	6	4	2	0	2.0
27.	30	2.0	6	0	6	0	2.0
28.	28	2.0	6	0	6	0	2.0

OUTPUT

Individual	Conflict Situation						Total
	1	2	3	4	5	6	
1.	112	177	68	120	84	108	669
2.	157	137	99	84	151	121	749
3.	77	120	97	69	86	127	576
4.	57	48	74	33	57	111	380
5.	57	62	63	56	80	99	417
6.	39	22	37	25	22	49	194
7.	92	93	135	91	82	126	699
8.	64	82	88	53	85	74	446
11.	49	40	71	36	38	115	349
12.	112	149	47	60	62	143	573
13.	65	37	60	38	50	69	319
14.	35	43	53	25	41	51	248
15.	68	52	58	36	36	53	303
16.	111	129	87	56	77	87	547
17.	40	69	45	51	54	60	319
18.	78	64	76	55	94	72	439
21.	53	45	47	28	43	80	296
22.	113	59	103	66	149	163	653
23.	50	68	80	53	46	72	369
24.	146	262	76	70	89	46	689
25.	53	62	89	46	55	37	336
26.	42	62	132	42	108	117	503
27.	162	233	116	184	100	172	967
28.	57	76	81	59	73	64	410

TIME

Individual	Minutes	Individual	Minutes	Individual	Minutes
1.	31	11.	19	21.	25
2.	46	12.	49	22.	63
3.	38	13.	28	23.	36
4.	34	14.	21	24.	75
5.	37	15.	31	25.	29
6.	38	16.	49	26.	50
7.	59	17.	25	27.	49
8.	30	18.	35	28.	76