

A MODEL OF MIXED-MOTIVE INTRA-ALLIANCE NEGOTIATION BEHAVIOR

by

FAYE NELLA SCHMIDT

B.A., University of Alberta, 1979  
M.Ed., University of Alberta, 1981

A DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY

in the Department  
of  
Psychology

ACCEPTED  
FACULTY OF GRADUATE STUDIES

We accept this dissertation as conforming  
to the required standard

21 Dec 88


DEAN

  
Dr. Eric S. Lee

  
Dr. Bram C. Goldwater

  
Dr. Ronald A. Hoppe

  
Dr. Michael E. J. Masson

  
Dr. Roy V. Ferguson

  
Dr. R. Edward Overstreet

(c) Faye Schmidt, 1988  
University of Victoria

All rights reserved. This dissertation may not be reproduced  
in whole or in part, by mimeograph or other means,  
without the permission of the author.

Supervisor: Dr. Eric S. Lee

### **Abstract**

A new theoretical model of mixed-motive intra-alliance negotiations is presented and tested. The assumptions in this model address: (a) cooperative and individualist goals, (b) positions of mutual dependence, (c) perceptions of power, (d) standards of fairness (equity and resource scarcity or need), and (e) outcomes (conflict and effective power). The model was developed with reference to the crisis game which simulates two-party negotiations in NATO over defense spending. It proposes that as negotiators interact over decisions relating to their cooperative and individualistic goals, several factors come into play (factors which are linked to the negotiator's relative levels of resources and the importance of these resources to the alliance's goals). One factor is the extent to which the negotiators are mutually dependent to obtain or maximize these goals. Another is the amount of power each is perceived to have. A third factor is the influence of the value of fairness which is assumed to impact contribution strategies and the negotiator's ability to justify the solutions they favor. These factors are used to predict levels of conflict and financial outcomes (e.g., high conflict will occur when negotiators are mutually dependent and there is a large discrepancy in their level of resource scarcity or need). In contrast to other crisis game models, this model generates predictions for a larger range of negotiation behaviors and outcomes in addition to predicting the amount of conflict. The model demonstrates a mathematical modelling approach

in a complex situation, clarifies concepts important to intra-alliance negotiations, and advances theoretical knowledge.

Many of the model's predictions were tested in two experiments utilizing the crisis game. These studies examined the impact of different economic contexts on several negotiation behaviors and outcomes (e.g., desired and actual financial outcomes, concessions, perceived and effective power, conflict, defense fund spending, individual contribution strategies, and the importance of goals). In Experiment 1 the ratio of the resources needed by the alliance (to meet external threats) to available resources was held constant while the relative resources of the negotiators were varied (100 resources were divided using a .50/.50, .75/.25, and a .95/.05 division). In Experiment 2 the .75/.25 division was replicated with a new ratio of needed to available resources (in Experiment 1 the total resources were less than the maximum threat and in Experiment 2 the alliance's resources exceeded it). These experiments offer substantial support for the model including its new predictions linking conflict to both of the economic factors considered. In Experiment 1 a curvilinear conflict pattern was found with most conflict in the .75/.25 condition. In Experiment 2 the new level of resources resulted in a low level of conflict for this resource division. These results show that the model predicts the data reported in past studies (A. Bavelas, personal communication, 1977; Lee, 1986; Vitz and Kite, 1970) as well as new economic contexts not previously considered.

Examining Committee:

[REDACTED]  
Dr. Eric S. Lee

[REDACTED]  
Dr. Bram C. Goldwater

[REDACTED]  
Dr. Ronald A. Hoppe

[REDACTED]  
Dr. Michael E. J. Masson

[REDACTED]  
Dr. Roy V. Ferguson

[REDACTED]  
Dr. R. Edward Overstreet

## Table of Contents

Title page .....	i
Abstract .....	ii
Table of Contents .....	v
List of Tables .....	viii
List of Figures .....	ix
Acknowledgements .....	xi
Chapter One -- Introduction .....	1
Crisis Game Models .....	5
The Vitz and Kite Model .....	6
Other Crisis Game Models .....	9
Conclusions -- Studies Using the Crisis Game .....	11
Chapter Two -- A New Model of Mixed-Motive Intra-Alliance	
Negotiation Behavior .....	13
Summary of the Model .....	13
Goals of the Negotiators .....	18
Inter- or Mutual Dependence .....	20
Survival Independence and Dependence .....	20
Financial Independence and Dependence .....	23
Mutual Dependence .....	30
Perceived Power .....	33
Fairness .....	38
Equity .....	40
Corollary 1 -- Desired Improvement .....	43
Resource Scarcity .....	47
Corollary 1 -- Actual Financial Improvement .....	52

Outcomes .....	57
Conflict .....	58
Final Ratio of Resources .....	59
Summary .....	74
Chapter Three -- Empirical Evidence For the Proposed Model	
of Mixed-Motive Intra-Alliance Negotiation	
Behavior .....	80
The Crisis Game .....	82
Method of Playing the Crisis Game .....	82
General Features of the Crisis Game .....	83
Experiment One .....	86
Method .....	86
Results .....	89
Outcome Predictions .....	90
Process Predictions .....	104
Discussion .....	129
Experiment Two .....	134
Method .....	135
Results .....	136
Outcome Predictions .....	136
Process Predictions .....	138
Discussion .....	142
Chapter Four -- General Discussion .....	146
Future Research Directions .....	152
Footnotes .....	160
References .....	162

Appendix A .....	169
Appendix B .....	172
Appendix C .....	173
Appendix D .....	176

**List of Tables**

## Table

1	Theoretical Levels of Survival Independence, Dependence and Mutual Dependence .....	24
2	Theoretical Levels of Financial Independence, Dependence, and Mutual Dependence .....	29
3	Theoretical Levels of Effective Power and Final Ratio of Resources .....	70
4	Predicted and Empirical Financial Outcomes .....	101
5	Defense Fund Size .....	102
6	Ratings of Goals, Perceived Power, Fairness, and Importance of the Resource Discrepancy .....	105
7	Individual Contribution Strategies .....	109
8	Desired Improvement .....	111
9	Concessions .....	126

## List of Figures

### Figure

1	Empirical results reported by Vitz and Kite (1970) and A. Bavelas (personal communication, 1977) demonstrating the relationship of conflict (over individual contributions) to the division of 75 units of resources between two players in the crisis game .....	7
2	Predicted levels of survival mutual dependence for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice .....	31
3	Predicted levels of financial mutual dependence for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice .....	32
4	Predicted levels of perceived power for negotiators with differing proportions of resources in alliances with total resources ranging from 50 to 400 units (all values assume a constant threat of $E(T) = 70$ ) .....	36
5	Predicted levels of resource scarcity for negotiators with differing proportions of resources in alliances with total resources ranging from 50 to 400 units (all values assume a constant threat of $E(T) = 70$ ) .....	49
6	Predicted levels of average mutual dependence for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice .....	60
7	Predicted levels of conflict for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice .....	67
8	Average ratings (0 to 100) made by subjects for three conflict scales: (a) individual contribution conflict, (b) DF size conflict, and (c) overall conflict in three resource division conditions in Experiment 1 and the single condition in Experiment 2 .....	92

9	Average ratings (0 to 100) made by observers for three conflict scales: (a) individual contribution conflict, (b) DF size conflict, and (c) overall conflict in the three resource division conditions in Experiment 1 and the single condition in Experiment 2 .....	95
10	Average ratings of perceptions of relative power made by subjects before the first round of negotiations for the three resource division conditions in Experiment 1 and the single condition in Experiment 2. Zero indicates that Player y has the most control and 100 that Player x has the most control over the negotiations .....	107
11	Average amount of improvement desired by each player (defined as the percent of Player x's resources that Player y's desired improvement represents where improvement is the predicted contribution or PC amount minus the amount the player wanted to contribute). Data are reported for the three resource conditions in Experiment 1 and the single condition in Experiment 2 .....	113
12	Desired improvement by round for players in the (a) .50/.50 division of resources, (b) .75/.25 division of resources, (c) .95/.05 division of resources, and (d) Experiment 2 .....	115
13	Average percent of their own resources that each player undercontributed (where undercontributions were defined as the difference between the amount a player actually contributed and the amount predicted by a PC strategy). Data are reported for the three resource conditions in Experiment 1 and the single condition in Experiment 2 .....	119
14	Undercontributions by round for players in the (a) .50/.50 division of resources, (b) .75/.25 division of resources, (c) .95/.05 division of resources, and (d) Experiment 2 .....	121
15	Average concessions of each player (where the concessions of Player x were defined as the difference between the proportion of the DF that Player x wanted to and actually contributed expressed as a percentage of Player y's resources). Data are reported for the three resource conditions in Experiment 1 and the single condition in Experiment 2 .....	127

### Acknowledgements

The author would like to thank several people whose assistance made this dissertation possible:

Dr. Eric Lee who stimulated my interest in mathematical modeling and intra-alliance negotiation behavior. Dr. Lee provided excellent supervision, encouragement, and assistance throughout this research. The many hours we spent working on ideas were the most enjoyable part of my program;

Dr. Edward Overstreet for his time and interest in serving as the External Examiner;

The supervisory committee: Dr. Roy Ferguson who was always willing to provide support even through a major change in my research area, Dr. Bram Goldwater who contributed a significant amount of time and effort and offered valuable insights, Dr. Ronald Hoppe who not only helped with this dissertation but also made it possible for me to gain some teaching experience, and Dr. Michael Masson who willingly stepped in during the final stages of this work;

Dr. Brian Dippie for chairing the oral defense in such a friendly and relaxed manner;

The many volunteer subjects who contributed their time to this research;

The American Psychological Association, the North Atlantic Treaty Organization, the Social Sciences and Humanities Research Council of Canada, and the University of Victoria for their financial support;

My family for their love and support and especially my mother who, by her example, showed me the value of receiving an education;

and, above all, my husband, Dr. Barry Carbol, who contributed more than he will ever know by offering unconditional love, patience, understanding, and support throughout all of my education.

## CHAPTER ONE

### Introduction

It has been suggested that "ours is an age of negotiation" (Zartman, 1976, p. 2). Social, political, economic and other pressures frequently bring parties together for collective decision-making. Researchers from many disciplines have studied this process in an attempt to develop explanatory theories and models of negotiation behavior. While much has been written on negotiations in general, and on specific topics such as coalition formation, little theoretical or empirical work has considered patterns of negotiation behavior that occur within existing coalitions or alliances (including formal alliances and other groups or organizations with common or joint goals). As Bazerman and Lewicki (1985, p. 13) observed, "few empirical studies of internal or external organizational negotiation actually exist", a "strong emphasis should be placed on studies which report the differential outcomes of negotiations (e.g. resources actually gained or lost...) in addition to attitudinal and perceptual data". Likewise, the literature examining fairness, decision-making, and other negotiation processes is also limited. Deutsch (1985, p. 100) noted that "There are too few empirical studies of the sociopsychological effects of different systems of distributive justice. How do different systems work under different conditions: for example, as a function of the amount available for distribution, the type of value to be distributed, the size of the group, the nature of their interdependence?". Similarly,

Thompson, Mannix, and Bazerman (1988, p. 86) concluded that "there has been little research that examines negotiations as an interactive decision-making process in which parties reveal preferences, seek information, attempt to persuade others, and adopt bargaining strategies".

The omission of intra-alliance negotiation behavior has been attributed to the common perception of such groups as wholistic, integrated units in which conflict is to be avoided and negotiation is unnecessary (Bacharach & Lawler, 1980). However, by their nature, alliances are often confronted with issues that result in negotiated decisions affecting many or all of their members. The purpose of this dissertation is to develop and empirically test a new theoretical model of intra-alliance negotiations pertaining to economic decision-making.

The framework for delineating the focus of this model was provided by Eccles (1983) who suggested that negotiations within organizations can be categorized along two dimensions: (a) an internal or an external orientation (i.e., within the organization or between an organization and its external environment), and (b) a resource or an ideological substantive focus. This model looks at the internal or intra-group negotiations of alliances dealing with resource related issues. Alliances are groups composed of subunits united for a common or cooperative purpose. They are a unit of analysis that lend themselves to considerations of intra-group processes since their subunits are usually well defined and the identity of the units collectively (as an alliance) is clear. They

differ from many other groups that have been subjected to intra-group analysis in that (a) their members are often subgroups rather than individuals (although the subgroups may be represented by individuals), and (b) they have a clear, cooperative bond. This bond has been observed to lead to different outcomes than negotiations in more individualistic contexts (Pruitt & Lewis, 1975; Schulz & Pruitt, 1978).

This model looks specifically at intra-alliance negotiations that, like most negotiations, involve both a cooperative and an individualistic goal (i.e., negotiations based on achieving outcomes that reflect mutual interests or advantages as well as self-interests). In this situation the negotiators are faced with more than the optimization of individual outcomes -- to be successful they must balance their individual goals with mutual goals. As such, this is a so-called "mixed motive" situation (Schelling, 1958).

Negotiations are a complex process of social interaction. To understand any particular type of negotiation, it is often beneficial to reduce it to its basic components and consider the ways in which these function. Games which simulate negotiations are an attempt to capture some of these basic components in a setting in which they can be controlled and analyzed (e.g., games such as the Prisoner's Dilemma Game have been used extensively). The models that have been used to explain intra-alliance resource oriented negotiations, and the new model developed here, employed an experimental game (the crisis game) as a reference.

The crisis game (described by Vitz and Kite (1970)) simulates

the negotiations of the North Atlantic Treaty Organization (NATO). In response to concern about the Warsaw Pact led by the Soviet Union, NATO members conduct negotiations aimed at the establishment of defense funds to support joint forces. In these talks there is frequent disagreement over how much should be spent and, in particular, the size of each country's contribution. To model the dynamics in this type of negotiations, the crisis game employs players representing hypothetical countries with varying levels of resources. These countries form an alliance that is faced with a potential external threat of unknown proportions. To survive, the alliance must negotiate how much it will collectively spend on defense against this threat and how much the individual countries will contribute to the joint defense fund. If the players do not maintain a defense fund (DF) larger than the threat, a crisis occurs and all countries in the alliance are overthrown thereby ending the game. If an adequate DF is maintained, all will survive the game and be allowed to keep their country's unspent resources. In this way, the players are faced with a decision requiring cooperation (i.e., ensuring the survival of their countries by maintaining an adequate joint DF) and one that is based on individualistic goals (i.e., maximizing their payoff by spending as little of their country's resources as possible).

In playing the crisis game each player is given a portion of the total resources available to the alliance for defense spending. The players use their resources to make contributions to a joint DF in several rounds of play. For each round they negotiate two decisions:

(a) the size of the DF, and (b) how much each party will contribute. When the players have concluded their negotiations for a given round the threat is presented (e.g., by summing the total rolled by four dice). If the DF negotiated by the players is greater than or equal to the threat the countries survive and the game continues for a total of five rounds. (A more detailed description of the crisis game is provided in Chapter Three).

This description of the crisis game shows that it incorporates many features of an alliance such as NATO. Like most alliances, NATO relationships are complex and are not restricted to a single focus (such as military security). Rather, NATO negotiations involve several types of relationships that have been described as a "political economy" that includes security, economic relations, and attempts to establish a significant political force (Morse, 1976, p. 66). The mixed-motive negotiations of the crisis game simulate this context by placing security or defense decisions within a framework of economic interdependence and an individualistic goal. The crisis game is, however, limited to economic decision-making within the alliance as ideological concerns and many other issues have been excluded (e.g., risk sharing, relations between NATO and other countries, etc.).

### **Crisis Game Models**

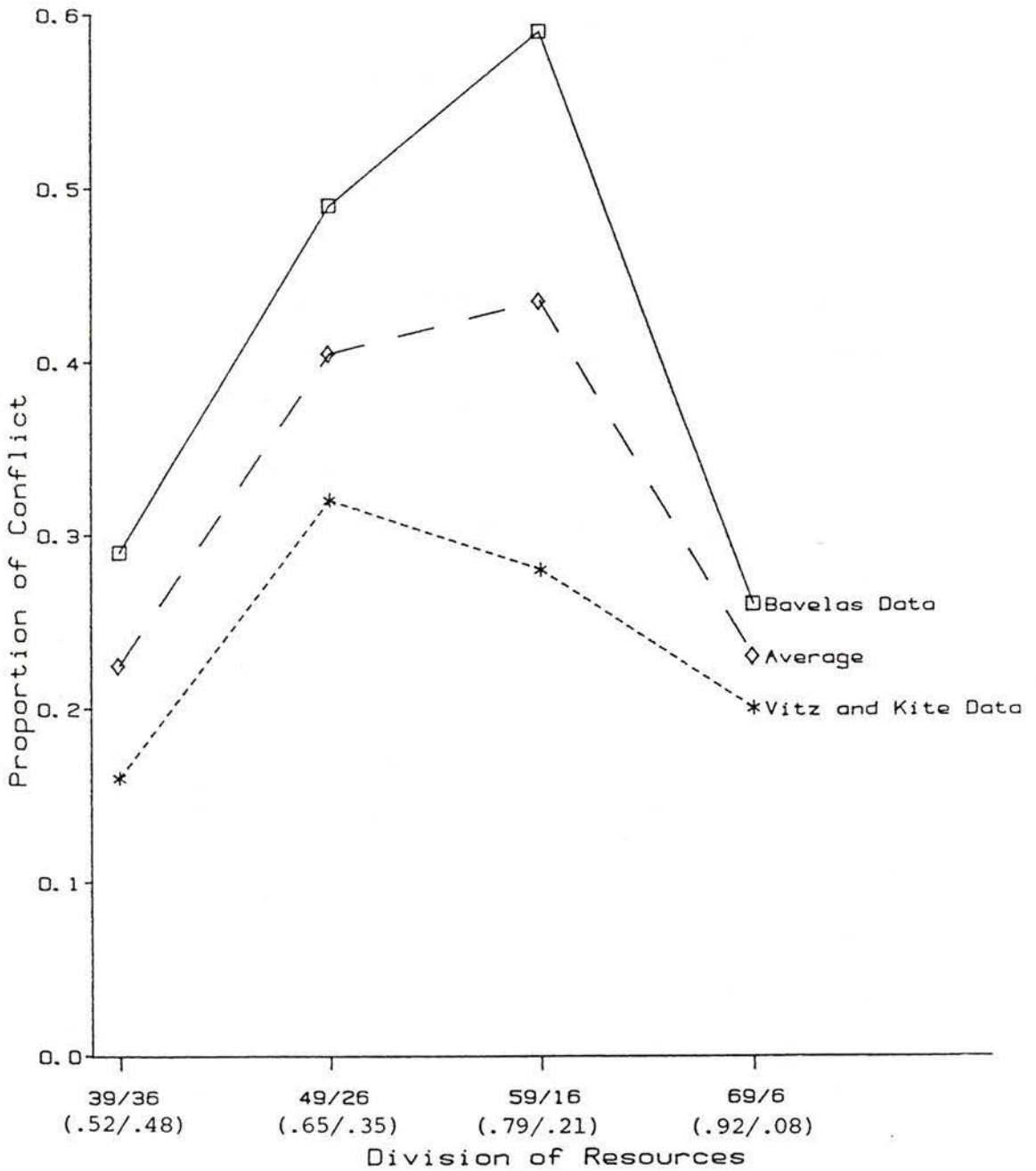
Three models have been developed to explain the type of negotiations simulated by the crisis game.

### The Vitz and Kite Model

Using the crisis game as a reference, Vitz and Kite (1970) developed a model of intra-alliance negotiation behavior based on Festinger's (1954) social-comparison theory. This model focused on how comparisons of relative resource levels influence negotiations. Specifically, they proposed that in the crisis game: (a) the negotiator with fewer resources will have a tendency to try to diminish the resource discrepancy, and (b) when the resource discrepancy is very large the smaller resource holder will tend to stop making comparisons. From this they predicted that two factors -- the "importance of the discrepancy" and the "pressure to reduce the discrepancy" (p. 236) -- are linked to conflict in the negotiations such that "conflict will increase the greater the discrepancy in resources until the discrepancy starts to get so large that the smaller player begins to stop comparing, with the result that conflict starts to drop off" (p. 236). This results in a predicted pattern of conflict that follows an inverted-U shaped function and peaks when there is a 75% - 25% split of resources. The empirical results reported by Vitz and Kite (presented in Figure 1) support this prediction. The conflict measure in this figure is based on a content analysis of the negotiations (i.e., the proportion of statements about individual contributions that contained conflict).

The main weakness in Vitz and Kite's model is that while it correctly predicted the shape of the conflict function, the rationales underlying it are questionable. Their derivations based

Figure 1.



Empirical results reported by Vitz and Kite (1970) and A. Bavelas (personal communication, 1977) demonstrating the relationship of conflict (over individual contributions) to the division of 75 units of resources between two players in the crisis game.

on Festinger's social-comparison theory are limited in several ways. First, their predictions were based solely on the comparisons made by the smaller resource holder. The role of the second negotiator is ignored and, by implication, in their model conflict originates from the motive of only one party. It is more probable that it can originate from any party or from the interaction of all parties. Second, they assumed that the smaller negotiator would strive to diminish the discrepancy without providing any rationale for why this would be the case for only one party. Festinger's theory dealt with an upward drive that was not limited to disadvantaged individuals. It is likely that all negotiators make comparisons of their resource holdings with the goal of changing the discrepancy in a way that maximizes their individual positions. Third, Vitz and Kite predicted that when the discrepancies were large, the smaller party would stop making comparisons. One possible logical conclusion of this is that there would be no negotiations at all when the discrepancy exceeds a given value as the smaller party would have no evaluative basis from which to negotiate. Festinger's theory seems to suggest instead that people prefer to make comparisons with others who are more like themselves, and that these comparisons are more stable and accurate than those made with dissimilar people. In discrepant situations (like those in the crisis game) there may be less of a tendency to compare, and the comparisons may be less accurate, but it is unlikely that they cease to be made. Finally, in addition to these conceptual problems there are weaknesses in the operationalization of Vitz and Kite's assumptions that make them difficult to test or interpret

psychologically. For example, it is unclear what either factor in their model is or how they can be measured. Vitz and Kite did not attempt to assess these factors in any way. There were no tests made of the assumptions that predicted the conflict pattern (they had only general, post hoc observations with which to examine their model). As would be expected given the above problems, they found that "the general content of the negotiations seemed unlike what social-comparison theory would predict. The social-comparison rationale is based solely on the aspirations of the disadvantaged negotiator, while our observations implicate both parties" (Vitz & Kite, 1970, p. 141). Consequently, the basic assumptions developed by Vitz and Kite appear to be questionable.

#### Other Crisis Game Models

Two other models have been developed to explain the crisis game. Alex Bavelas (personal communication, 1977) developed a model that linked conflict to the perceptual differences of negotiators with discrepant amounts of resources. This model rests on two assumptions. First, as the discrepancy in the resources of the players increases there is an increase in conflict as there is more opportunity for the players to hold different perceptions of the significance of a resource unit, and hence of what constitutes a fair contribution. Second, when the discrepancy in resources is large, conflict will drop off as the small players have so little that their contribution will have little consequence. The mathematical expression of these assumptions produces a curvilinear conflict pattern much like the Vitz and Kite (1970) model. As demonstrated in

Figure 1, this conflict prediction has received empirical support.

This model shares one of the weaknesses of the Vitz and Kite model -- while there is support for the major conflict prediction there is no evidence that tests either assumption and consequently, their validity is unknown. In contrast to the Vitz and Kite model, this model proposes concepts that can be more readily interpreted (e.g., fairness and the impact of a contribution on the threat).

The first assumption in this model is an aspect of the crisis game model developed by Lee (1986, unpublished). As fairness is a subjective concept Lee proposed that it can take many forms all of which seem to be derived from a proportionate (equity based) or an equal division of costs and outcomes. This model assumed that conflict varies as a function of the dollar value discrepancies produced by different fair play strategies. When faced with more than one possible strategy, this model assumed that negotiators will adopt the one that is most favorable to them (i.e., the one that requires them to spend less of their resource). As a result, when a discrepancy exists between the resources of the negotiators, the smaller party will want to contribute to the DF using a proportionate sharing of costs and the wealthy party will want an equal sharing. When there is an extreme discrepancy in resources Lee held that the amount the smaller players can contribute is so limited that there is little difference in their contribution by either strategy. Since conflict is assumed to vary with divergence in contribution amounts, Lee's model also predicts a conflict curve that varies with the division of resources between the negotiators and peaks when a

moderate resource discrepancy exists.

Lee tested this model using a questionnaire form of the crisis game that examined the amounts negotiators in different resource distributions wanted to contribute. Lee classified her data according to the type of strategy each party used. A reassessment of her data revealed that as predicted, 81% of the small parties recommended a strategy that favored them (one based on proportionate cost sharing). However, only 42% of the wealthy negotiators picked their favorable equal cost strategy while 58% picked the proportionate cost strategy. Consequently, Lee's assumptions regarding the type of strategies used may not be supported.

#### Conclusions -- Studies Using the Crisis Game

The models developed by Vitz and Kite (1970), A. Bavelas (personal communication, 1977), and Lee (1986) offer interesting insights into mixed-motive negotiation behavior within alliances. In spite of the differences in their implementation of the crisis game they all obtained similar findings -- the pattern of conflict (for conditions varying the economic discrepancy between the negotiators) followed an inverted-U shaped function.

The major difference between these studies is in their explanatory models. The weaknesses and lack of substantiation in the Vitz and Kite model appear to be sufficient to discard it. In Lee's model the assumption regarding the type of strategy negotiators use must be questioned but her data, and the Bavelas model, demonstrate the importance of strategies consistent with the value of fairness. Both of these models are limited however, in that they do not develop

adequate links between the resource distributions of the players and the strategies they select, and they address a small range of negotiation behaviors.

In all, the available evidence suggests that there is a relationship between conflict and resources in negotiations by members of an alliance. What is needed is a stronger, more comprehensive explanatory model that can be adequately tested. This dissertation proposes a new model that highlights some of the central processes involved in mixed-motive intra-alliance negotiation behavior. Chapter Two describes the model and discusses the related literature. In Chapter Three two experiments are presented that tested many aspects of the model. Finally, in Chapter Four the model and experiments are discussed and future research directions are identified.

## CHAPTER TWO

### A New Model of Mixed-Motive Intra-Alliance Negotiation Behavior

A new theoretical model has been developed to predict intra-alliance negotiation behavior when an alliance deals with economic issues. This model used the simulation of intra-alliance negotiations provided by the crisis game as a reference. This chapter will first summarize the assumptions contained in the model and their related mathematical expressions. Following this, each assumption will be individually explored and the specific predictions they generate will be identified.

#### Summary of the Model

1. Goals of the Negotiators - The behavior of all negotiators will be governed by the outcome goals of survival and financial payoff.
2. Inter- or Mutual Dependence - The degree to which the negotiators must work together in order to obtain or maximize their outcome goals varies as their individual resources vary relative to each other and to the threat.
  - a) **Independence** - The degree to which the negotiators can independently obtain or maximize their outcome goals depends upon their resources.

The independence (I) of a negotiator is defined as

- (i) **Survival Independence (SI)**: the extent to which they can survive alone given each of their economic strengths

$$\begin{aligned}
 SI_x &= \max p(\text{survival alone of player } x) \\
 &= p(\max DF_x \geq T) = p(R_x \geq T)
 \end{aligned}$$

where  $DF_x$  is the total defense fund player  $x$  can establish,  $T$  is the size of the total threat, and  $R_x$  is the economic strength or resources of player  $x$ . These and all subsequent equations are stated in terms of player  $x$ . Similar calculations are made for player  $y$ .

(ii) **Financial Independence (FI)**: the extent to which a negotiator can obtain financial payoff alone

$$\begin{aligned}
 FI_x &= \max E(\text{winnings of player } x \text{ alone})/R_x \\
 &= \max [p(\text{surviving of player } x \text{ alone}) * W_x]/R_x
 \end{aligned}$$

where  $W_x$  (or the amount won by player  $x$ ) equals

$$R_x - DF_x.$$

**b) Dependence** - The degree to which a negotiator relies on the other party to obtain or maximize his/her outcome goals varies as the resources of the negotiators vary. The dependence ( $D$ ) of a negotiator is defined as

(i) **Survival Dependence (SD)**: the extent to which a negotiator relies on the other negotiators' funds to ensure his/her survival.

$$\begin{aligned}
 SD_{xy} &= SI_{xy} - SI_x \\
 &= \max p(\text{survival together}) - \max p(\text{survival alone of player } x)
 \end{aligned}$$

where  $SD_{xy}$  is the survival dependence of player  $x$  on player  $y$  and  $SI_{xy}$  is the survival independence of players  $x$  and  $y$  together.

(ii) **Financial Dependence (FD)**: the extent to which a

negotiator relies on the other party to obtain more payoff.

$$\begin{aligned} FD_{xy} &= FI_{xy} - FI_x \\ &= [\max E(\text{winnings of } x \text{ and } y \text{ together})]/R - FI_x \\ &= \max [p(\text{surviving together}) * W_{xy}]/R - FI_x \end{aligned}$$

where  $FD_{xy}$  is the financial dependence of player  $x$  on player  $y$ ,  $FI_{xy}$  is the financial independence of players  $x$  and  $y$  together,  $R$  is the total resources of the alliance,  $W_{xy}$  are the winnings of players  $x$  and  $y$  together, and  $W_{xy} = R - DF$  where  $DF$  is the size of the total defense fund established by players  $x$  and  $y$  together.

**c) Inter- or Mutual Dependence-** The degree to which the negotiators are jointly dependent on each other to obtain or maximize their outcome goals also varies as their resources vary. The inter- or mutual dependence (MD) of the negotiators is defined as

(i) **Survival Mutual Dependence (SMD):** the extent to which they both depend on each other for their survival.

$$SMD = SD_{xy} * SD_{yx}$$

(ii) **Financial Mutual Dependence (FMD):** the extent to which both parties rely on each other to maximize their financial payoff.

$$FMD = FD_{xy} * FD_{yx}$$

(iii) **Average Mutual Dependence (AMD):** the average survival and financial mutual dependence of a dyad.

$$AMD = (SMD + FMD)/2$$

**3. Perceived Power** - The negotiators' a priori expectations of

each party's influence or control in the negotiations (referred to as perceived power or PP) will be dependent upon their relative wealth and the relationship of the expected threat or E(T) to their resources.

$$PP_x = P_x * [E(T)/(E(T) + R)]$$

where  $P_x$  is the proportion of resources held by player x or  $R_x/R$ .

4. **Fairness** - As a means of maximizing the probability of obtaining the outcome goals, the negotiators will cooperate and their negotiations will be governed by standards of fairness (specifically, the fairness standards of equity and resource scarcity or need).

- a) **Equity** - Perceptions of power (or the proportion of total resources held by each negotiator) will govern expectations of what is a fair contribution (the PFC or perceived fair contribution).

$$PFC_x = PP_x / PP_y = P_x / P_y$$

This results in the use of a proportionate cost (PC) strategy.

$$PC_x = P_x * DF$$

Corollary 1 - Desired Financial Improvement: The larger negotiators will want to improve their financial position (over and above their PC share) by an amount that is dependent on their perceived power. The improvement desired by the poorer negotiators will be small and will not vary.

- b) **Resource Scarcity** - The relative resource scarcity (or need) of the negotiators will govern their actual contributions.

Resource scarcity (RS) varies inversely with the negotiator's proportion of resources and directly with the expected threat relative to their resources.

$$RS_x = (1 - P_x) * [E(T)/(E(T) + R)]$$

The difference in the proportion of resource scarcity (DRS) of the negotiators in a dyad is defined as:

$$DRS = RS_y / (RS_x + RS_y) - RS_x / (RS_x + RS_y).$$

Corollary 1 - Actual Financial Improvement: Actual improvements in payoff will be dependent upon resource scarcity (RS).

5. **Outcomes** - The level of conflict and the final amount of resources held by each negotiator will be determined jointly by the main elements in the model: average mutual dependency and differences in resource scarcity.

a) **Conflict** - The amount of conflict generated in the negotiations will vary with the average mutual dependence and the difference in resource scarcity of the negotiators as given by the following equation:

$$C = AMD * DRS.$$

b) **Final Ratio of Resources** - The final ratio of resources, which reflects the actual or effective power (EP) of the negotiators, will also vary with AMD \* DRS:

$$\begin{aligned} \text{Final Ratio} &= EP_x / EP_y \\ &= [P_x - (AMD * DRS)P_x] / [P_y + (AMD * DRS)P_x]. \end{aligned}$$

### Goals of the Negotiators

**Assumption 1:** The behavior of all negotiators will be governed by the outcome goals of survival and financial payoff.

In mixed-motive negotiations there are two opposing goals: (a) a cooperative goal, and (b) an individualistic goal. In negotiations similar to those in the crisis game, the cooperative goal is survival (specifically, in the crisis game it is the maintenance of a joint DF that is perceived to be sufficient to win the game). Survival is posited as the cooperative goal as (a) it is a joint outcome, and (b) defense is a public good that has been shown to contribute to international cohesiveness (Sandler & Cauley, 1975) or cooperation. The individualistic goal is the maximization of financial payoff since all negotiators are paid on the basis of their individual resource position at the conclusion of the negotiations. In the negotiations, the players make economic decisions that impact both the probability that they will survive, and the amount of resources they will receive as payoff. Consequently, they must find an acceptable balance between the goals of survival and financial payoff.

Defense or survival is posited as the main orientation of the alliances in the crisis game and, given this, it is predicted that the goal of survival will be more important than the goal of financial payoff. The basis for this proposition follows logically from the structure of the negotiations -- the opportunity to obtain financial payoff is contingent upon survival. In this game the negotiators cannot receive any payoff unless they first survive. Consequently, the primary focus of the negotiators must be on

survival both as a goal unto itself, and as a means of achieving the goal of payoff. If the goals vary in importance, then it follows that the players will sacrifice less important goals in order to maintain more important goals -- financial payoff will be sacrificed to obtain a solution that ensures survival.

From this assumption several specific predictions can be derived:

1. Both outcome goals (survival and payoff) will be subjectively rated as important by the negotiators.
2. The importance of these goals is implicit in the structure of the negotiations and, consequently, they will not be affected by changes in the context of the negotiations. As a result, these ratings will be the same for negotiators with any division of resources (i.e., all ratings by players  $P_x$  and  $P_y$  will be the same), or in any economic context (i.e., the ratio of the threat to resources).
3. Survival will be rated as more important than payoff by all negotiators.
4. Since survival is important, the players will establish DFs above the amount needed to meet the most probable threat (the  $E(T)$ ).
5. As survival is more important than payoff, it follows that the players will establish DFs above the amount that generates the maximum expected winnings (the  $\max E(W)$ ).
- 5a. As will be argued in the following section, the amount by which the players' DF exceeds the DF needed for the  $\max E(W)$  will be determined by their average survival independence.

### **Inter- or Mutual Dependence**

**Assumption 2:** The degree to which the negotiators must work together in order to obtain or maximize their outcome goals varies as their resources vary relative to each other and to the threat.

Negotiations involve separate parties working toward a joint solution. As such, this process has been described as an example of interdependence (Rubin, 1983). The inter- or mutual dependence assumption focuses on how the resources of each negotiator determine the extent to which they can independently obtain or maximize their outcome goals (i.e., their ability to function autonomously). Negotiators who have a small resource base (relative to the threat) have a small probability of survival, and little ability to realize any financial payoff alone. These players will be dependent on the other negotiator. When both parties are dependent, a mutual dependence (MD) is said to exist. (To the degree that one negotiator is independent, the mutual dependence of the dyad decreases.) In other words, mutual dependence exists only when there is some dependence by both negotiators, and its amount varies as the dependence of the parties varies. As there are two separate outcome goals, the mutual dependence of the negotiators is defined separately for each.

### **Survival Independence and Dependence**

#### **Survival Independence**

Survival independence (SI) is the extent to which a negotiator can survive the negotiations alone (it is the degree to which a player's survival can be determined autonomously). This is defined objectively as the maximum probability of survival if a player uses

all available resources for a DF (which may also be expressed as the maximum probability that the DF a player can establish alone, or the player's total resources, are greater than or equal to the threat):

$$\begin{aligned}
 SI_x &= \max p(\text{survival alone of player } x) \\
 &= p(\max DF_x \geq T) \\
 &= p(R_x \geq T) \qquad [1]
 \end{aligned}$$

where  $DF_x$  is the size of the total defense fund player  $x$  can establish,  $T$  is the size of the total threat, and  $R_x$  is the economic strength or resources of player  $x$ . (All equations are stated in terms of player  $x$ . Similar calculations are made for player  $y$ .)

For example, consider the situation where a player has 75 resource units and the total threat for five rounds of negotiations is 120 (or 24 per round). The maximum DF the player can establish is 75/5 or 15 per round. The probability that the player will survive is the probability that the threat will be 15 or less which, for a single round, is calculated to be .6643 (or the cumulative probability of the threat being between 1 and 15). The probability that the player will survive all five rounds with this DF (or the probability that the player's  $DF \geq T$ ) is  $.6643^5$  or .1294.

Given this equation, the total amount of survival independence ( $SI_x + SI_y$ ) of the two players will increase as the resources of the players increase relative to the threat. This means that as their total survival independence increases the players have more resources both to spend on their defense and to protect. It was previously suggested that survival is the dominant goal and that

players will be willing to sacrifice payoff (or spend more) in order to survive. As their survival independence increases they are able to establish a larger defense fund and it is anticipated that they will be motivated to do so. Consequently, it is predicted that as the survival independence of the players increases there will be an increase in their DF (i.e., the amount by which their DF exceeds the DF needed for the max E(W) will increase). As there are two players the total survival independence of the dyad is expressed as an average (the average survival independence or ASI):

$$ASI = (SI_x + SI_y)/2. \quad [2]$$

### Survival Dependence

Survival dependence (SD) is the extent to which each negotiator relies on someone else's funds for their survival. It is the difference between the probability of survival of the alliance or the players working together (which is the maximum probability of survival based on the total resources of the dyad, or the survival independence of the two parties jointly), and the probability of survival for an individual player working alone (or the survival independence of the player). The survival dependence of player x on player y is:

$$\begin{aligned} SD_{xy} &= SI_{xy} - SI_x && [3] \\ &= \max p(\text{survival together}) - \max p(\text{survival alone of player x}) \end{aligned}$$

where  $SD_{xy}$  is the survival dependence of player x on player y and  $SI_{xy}$  is the survival independence of the two players jointly.

For example, if a dyad has a total of 100 resource units and the total threat for five rounds of negotiations is 120 (or 24 per

round), then the probability of the players surviving by working together is the probability that their maximum DF of 20 per round (or  $100/5$ ) is greater than or equal to the threat. The cumulative probability of the threat being 20 on a single round is .9730 and the probability of surviving all five rounds with this DF (or  $SI_{xy}$ ) is  $.9730^5$  or .8721. If player x has 75 of these 100 resource units then  $SI_x$  is .1294 (as demonstrated above). This means that the survival dependence of player x on player y (or  $SD_{xy}$ ) is  $.8721 - .1294 = .7427$ . The survival dependence of player y on player x (or  $SD_{yx}$ ) is  $.8721 - 0 = .8721$  since player y with only 25 resource units can only contribute a maximum of 5 per round and has a zero probability of surviving all five rounds alone.

Both survival independence and dependence vary from 0.00 to 1.00. For players who are completely independent (i.e., their own resources can guarantee their survival), their survival independence is 1.00 and their survival dependence is 0.00. The SI, ASI, SD, and SMD values for a range of resource conditions are presented in Table 1. For this and subsequent tables and figures the threat is held constant and a range of total resource amounts are presented to show how the values change. Alternatively, the resource levels could have been held constant and the values for different levels of threat presented. As the values vary with the proportion of threat to resources either approach could have been employed.

### Financial Independence and Dependence

#### Financial Independence

Financial independence (FI) is the maximum amount of money a

Theoretical Levels of Survival Independence, Dependence, and Mutual Dependence

Condition	Survival Independence		Average Survival Independence	Survival Dependence		Survival Mutual Dependence
	x	y		x	y	
R = 50						
.50/.50	.000	.000	.000	.000	.000	.000
.75/.25	.000	.000	.000	.000	.000	.000
.95/.05	.000	.000	.000	.000	.000	.000
R = 100						
.50/.50	.000	.000	.000	.872	.872	.760
.75/.25	.129	.000	.065	.743	.872	.648
.95/.05	.757	.000	.379	.114	.872	.099
R = 160						
.50/.50	.255	.255	.255	.745	.745	.555
.75/.25	1.000	.000	.500	.000	1.000	.000
.95/.05	1.000	.000	.500	.000	1.000	.000
R = 300						
.50/.50	1.000	1.000	1.000	.000	.000	.000
.75/.25	1.000	.129	.565	.000	.871	.000
.95/.05	1.000	.000	.500	.000	1.000	.000

Note. For all values the threat is the roll of four dice (or a maximum of 24 for a single round of negotiations or 120 for the five rounds).

R is the total resources of the alliance divided in three ways between Players x and y (the .50/.50, .75/.25, and .95/.05 conditions).

negotiator can win alone (standardized by that player's resources so that the winnings of negotiators in different resource conditions are comparable). This is defined as the maximum expected winnings a player can generate taking into account the probability of surviving given a particular DF. This consideration of survival is essential given the structure of the negotiations (i.e., survival is necessary in order to obtain payoff). The maximum winnings are thus defined as the probability of surviving all of the rounds of negotiations given a particular DF, multiplied by the amount of payoff that the DF affords. This leads to the following mathematical expression of financial independence:

$$\begin{aligned} FI_x &= \max E(\text{winnings of player } x \text{ alone})/R_x \\ &= \max [p(\text{surviving of player } x) * W_x]/R_x \end{aligned} \quad [4]$$

where  $W_x = R_x - DF_x$ .

For example, consider again the player who has 75 resource units where the total threat for five rounds of negotiations is 120 (or 24 per round). This player can establish a range of possible DFs each of which has an associated probability of survival which is calculated as demonstrated above for survival independence (by taking the cumulative probability that the threat will be less than or equal to the DF to the fifth power). Furthermore, each of the possible DFs defines what the player's winnings will be as  $W_x = R_x - DF_x$  or, the winnings of a player with 75 units who established a DF of 10 on each round (for a total DF over five rounds of 50) would be  $75 - 50 = 25$ . The probability that this player would survive all five rounds with this DF is .0001. This means that the expected

winnings for this player would be the probability of surviving multiplied by winnings and standardized by the player's resources, or  $(.0001 * 25)/75 = .00003$ . Similarly, if this player spent 12 resource units on each round (for a total DF over five rounds of 60) this would produce a probability of survival of .0043 and 15 units (or  $75 - 60$ ) would be won. Consequently, the expected winnings of the player would be  $(.0043 * 15)/75 = .00086$ . By calculating the expected winnings for the range of DFs it is possible to identify the maximum amount the player could be expected to win and hence to determine  $FI_x$ . In the case of the player in this example, the maximum winnings or  $FI_x$  is .004.

As financial independence is standardized by a player's resources it can be viewed as the proportion of money the player can win alone.

### Financial Dependence

Like survival dependence, financial dependence (FD) is the amount a player can obtain by cooperating with the other player, or the difference between the financial independence of the two players jointly and an individual player's financial independence. It is the amount the dyad can win together minus the amount a player can win alone:

$$\begin{aligned}
 FD_{xy} &= FI_{xy} - FI_x && [5] \\
 &= [\max E(W \text{ of } x \text{ and } y \text{ together})]/R - \max E(W \text{ of player } x \text{ alone})/R_x \\
 &= \max [p(\text{surviving together}) * W_{xy}]/R \\
 &\quad - \max [p(\text{surviving of player } x \text{ alone}) * W_x]/R_x
 \end{aligned}$$

where  $FD_{xy}$  is the financial dependence of player x on player y

and  $FI_{xy}$  is the financial independence of the players jointly.

For example, in a dyad with 100 resource units where the total threat for five rounds of negotiations is 120 (or 24 per round) the maximum expected winnings of the dyad is .063 (calculated in the same manner as described above for the financial independence of a single player with 75 resource units). The financial independence of player x with 75 of these units was calculated above to be .004 and hence the financial dependence of player x on player y is  $.063 - .004 = .059$ . The financial dependence of player y on player x is  $.063 - .000 = .063$  since player y (with only 25 units of resource) has a zero probability of survival even if all 25 resource units are contributed. As payoff is contingent upon survival this player would not be expected to have any winnings and hence would have a financial independence of .000. As a result, this player is dependent on the alliance to the extent that the alliance can obtain payoff (which in this case is .063).

Conceptually, this equation for financial dependence can be seen as an expression of the financial degrees of freedom the negotiators have independently and as a member of the alliance. It compares the total financial potential of the alliance with that of an individual player without saying how much each player would receive. However, in this equation the winnings of the team do have an implication for  $R_x$  (the resources of an individual player) as  $R_x$  determines what proportion each will win. This is because the above equation for  $FD_{xy}$  is equivalent to:

$$FD_{xy} = [\max E(W_{xy}) * P_x] / R_x - FI_x \quad [6]$$

$$\text{since } P_x/R_x = (R_x/R)/R_x = 1/R.$$

As a result, the equation for financial dependence looks at the difference between what an individual player could win alone and as a member of an alliance if each member of the dyad received a proportionate amount of the total won by the team (i.e., the difference between a player's proportional share of the winnings derived from proportional DF contributions and winnings after that player assuming sole responsibility for the DF). For example, if the maximum winnings of players x and y together (expressed as a proportion) is  $.75(R)$  this is equal to  $.75(R_x + R_y)$  or  $.75R_x + .75R_y$ . Therefore, the amount that can be won together is an equal proportion of each party's own resources. It is true that a player may actually win more or less than this proportionate amount and hence that they could be said to have more or less financial dependence. The essence of the equation developed here however, is not these variations but rather the difference between the alliance and the individual negotiator or the combined financial independence of the players minus an individual's financial independence.

As is the case with survival independence and dependence, financial independence and dependence vary from 0.00 to 1.00. As the values for these two factors in Table 2 suggest, financial independence will be 1.00 only when a player's resources relative to the threat are exceptionally large (e.g., using equation 5 as illustrated above,  $FI_x = .9988$  when  $R = 100,000$  and player x has 100 percent of the resources). In most cases financial independence

Table 2

## Theoretical Levels of Financial Independence, Dependence, and Mutual Dependence

Condition	Financial Independence		Financial Dependence		Financial Mutual Dependence
	x	y	x	y	
R = 50					
.50/.50	.000	.000	.000	.000	.000
.75/.25	.000	.000	.000	.000	.000
.95/.05	.000	.000	.000	.000	.000
R = 100					
.50/.50	.000	.000	.063	.063	.004
.75/.25	.004	.000	.059	.063	.004
.95/.05	.044	.000	.019	.063	.001
R = 160					
.50/.50	.008	.008	.300	.300	.090
.75/.25	.158	.000	.150	.308	.046
.95/.05	.298	.000	.010	.308	.003
R = 300					
.50/.50	.291	.291	.330	.330	.109
.75/.25	.503	.004	.118	.617	.073
.95/.05	.602	.000	.019	.621	.012

Note. For all values the threat is the roll of four dice (or a maximum of 24 for a single round of negotiations or 120 for the five rounds).

R is the total resources of the alliance divided in three ways between Players x and y (the .50/.50, .75/.25, and .95/.05 conditions).

is small suggesting that it is usually more advantageous for the players to cooperate as cooperation generally produces a better individual payoff outcome.

### Mutual Dependence

The extent to which the negotiators are mutually dependent for either outcome goal reflects the extent to which both are dependent. As it is necessary for both players to exhibit dependence in order for a mutual or joint dependency to exist, the two individual dependencies are combined in a multiplicative (rather than an additive) manner. Consequently, if one party has no dependency, the mutual dependence of the dyad is zero (i.e., any dependency of the other party multiplied by zero will produce a mutual dependence of zero). Both survival and financial mutual dependence (SMD and FMD) will vary from 0.00 to 1.00 given the following definitions:

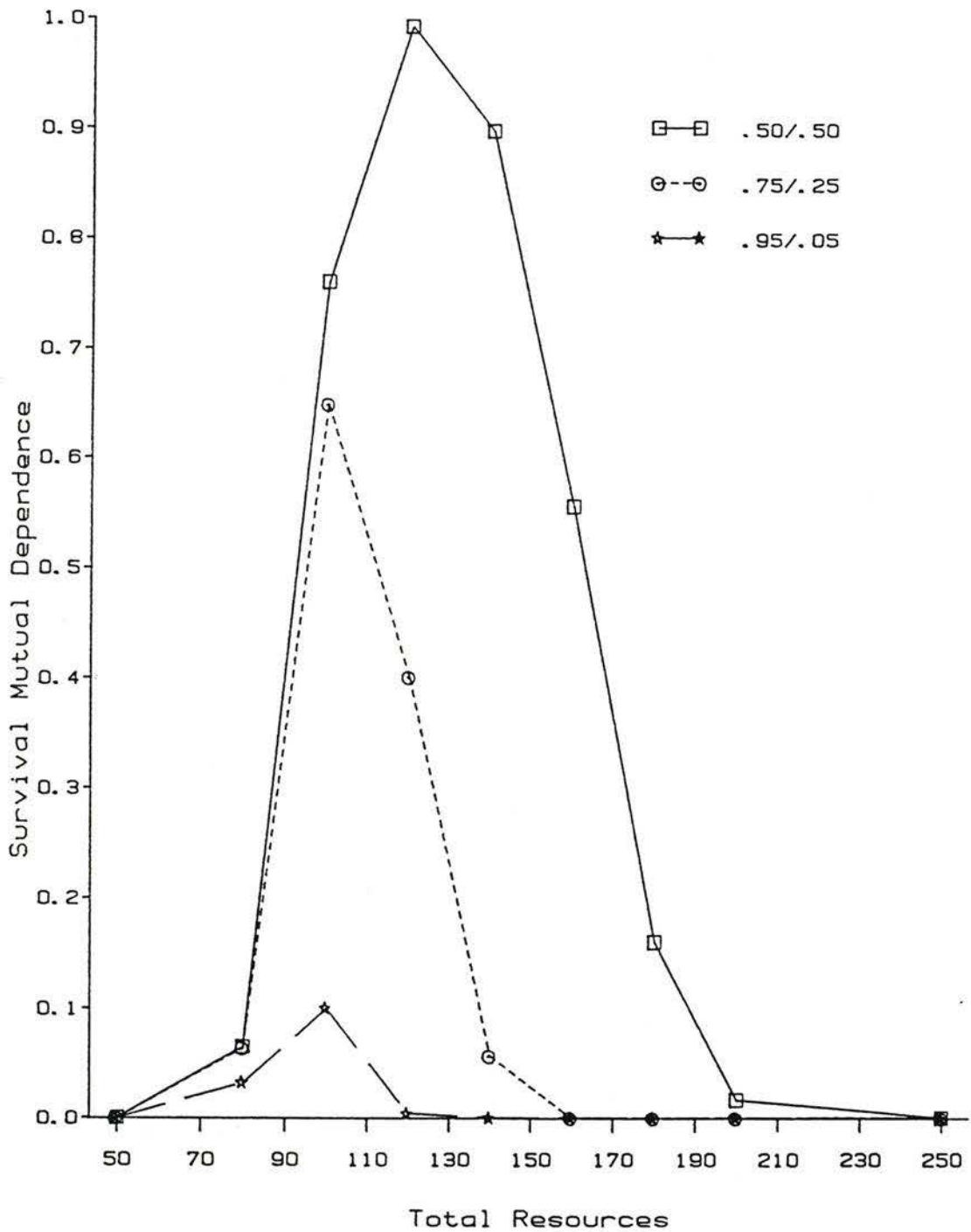
$$\text{SMD} = \text{SD}_{xy} * \text{SD}_{yx} \quad [7]$$

$$\text{FMD} = \text{FD}_{xy} * \text{FD}_{yx} \quad [8]$$

The values of SMD and FMD for a range of total resource conditions are plotted in Figures 2 and 3.

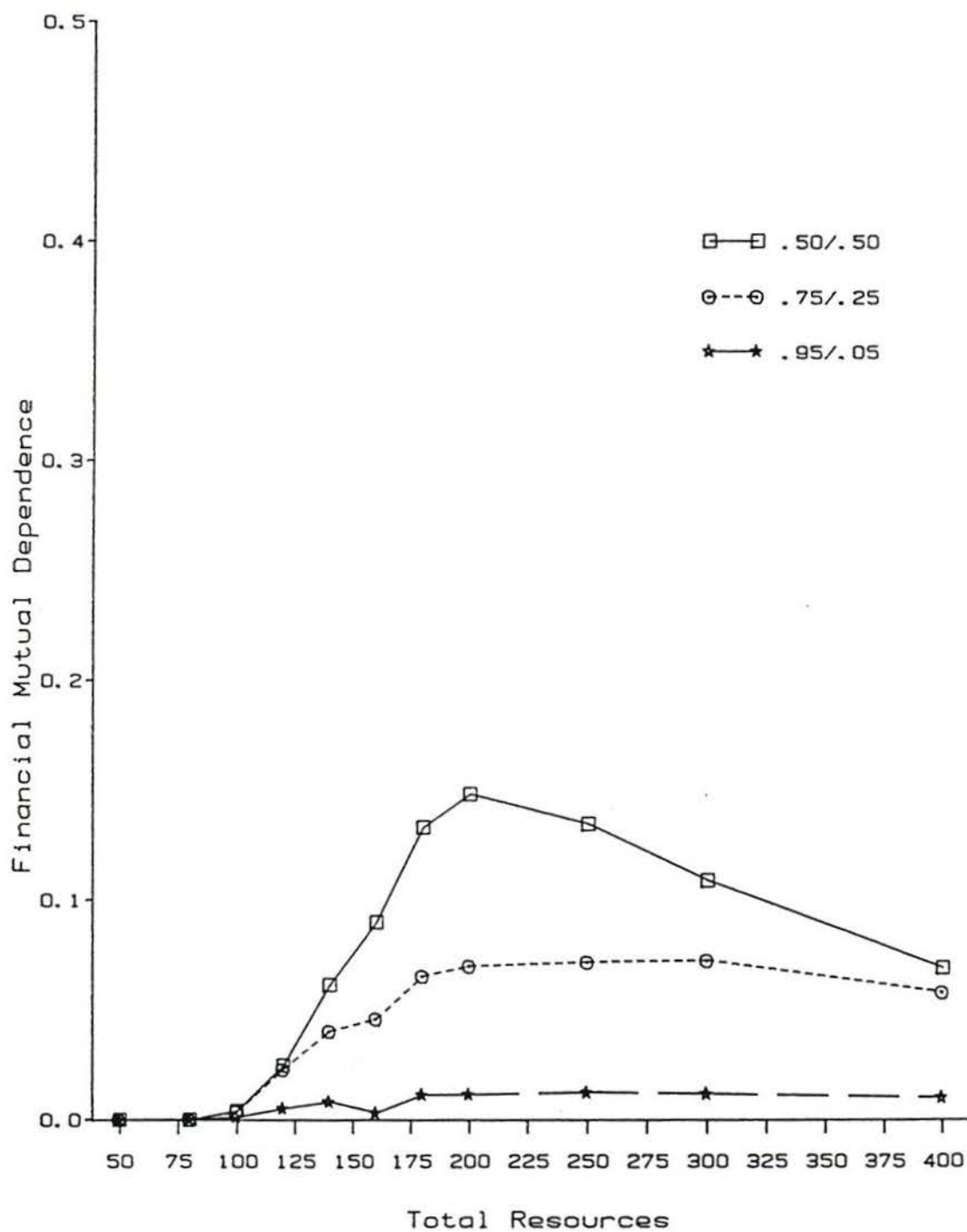
Mutual dependency (either SMD or FMD) varies with the dependency of each negotiator in a dyad. When there is a high level of mutual dependence the players need to work together in order to survive (SMD) or obtain payoff (FMD). Mutual dependence will be greatest when each negotiator can meet their goals if, and only if, they both cooperate -- what one party does in this situation has an important implication for the other party (e.g., if one decides not to contribute it will make a large difference to the other player's

Figure 2.



Predicted levels of survival mutual dependence for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice.

Figure 3.



Predicted levels of financial mutual dependence for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice.

chances of surviving or ability to obtain payoff). Conversely, when mutual dependence is zero, there is no need for the negotiators to work together since, for one or both of the parties, working together would not alter the probability that they will achieve their goals. A low level of mutual dependence can be produced in several ways as, for example, when the resources of the negotiators relative to the threat are very small or very large. If the total resources of the dyad are so small that the players have little chance of obtaining payoff or surviving, their actions cannot be described as mutually dependent -- what one does will not significantly impact the other. When resources are abundant and both parties can achieve their goals alone, the actions of one will have little consequence for the other and hence their mutual dependency is low. Finally, as previously discussed, when one player has an insufficient resource base (and consequently is dependent) and the other player has sufficient resources (and is independent) the result is low mutual or joint dependence.

### Perceived Power

**Assumption 3:** The negotiators' a priori expectations of each party's influence or control in the negotiations (referred to as perceived power or PP) will be dependent upon their relative wealth and the relationship of the expected threat or  $E(T)$  to their resources.

Perceived Power (PP) is the perceived ability of a player to exert influence or control over the negotiations. It is an a priori expectation of power derived from the resources or economic strength of each party -- the more resources a negotiator has the more

perceived power that player will have relative to the other player. This occurs because economic strength is seen as giving a negotiator the ability to impact the negotiations (i.e., as resources are a commodity necessary for survival, the player who controls the largest proportion of the resources will be perceived to be the most powerful). Consequently, perceived power is determined, in part, by the proportion of the total resources a player possesses, or

$$P_x = R_x/R. \quad [9]$$

While perceived power will vary with  $P_x$  in a relative sense, its absolute or overall value is determined by both the proportion of resources held by a player ( $P_x$ ) as well as the context of the threat in relation to the available resources. This contextual factor is represented by the ratio of  $E(T)/(E(T) + R)$  or the expected threat relative to the resources of the dyad. There are many possible ways of conceptualizing the relationship of the threat to resources (e.g.,  $E(T)/R$ ,  $E(T)/(E(T) + R_x)$ , etc.). The equation that was selected was preferred as: (a) it captures the intended factor (i.e., it shows how large the threat is relative to the resources), (b) it represents the entire context of the negotiations (i.e., by using  $R$  rather than  $R_x$  or  $R_y$  it places the threat in relation to the entire alliance rather than an individual player), and (c) like all of the other factors in the model, it produces values that range from 0.00 to 1.00.

By incorporating this contextual factor the perceived power equation produces a value that sets the proportion of resources a player has into the context of the expected threat and the total

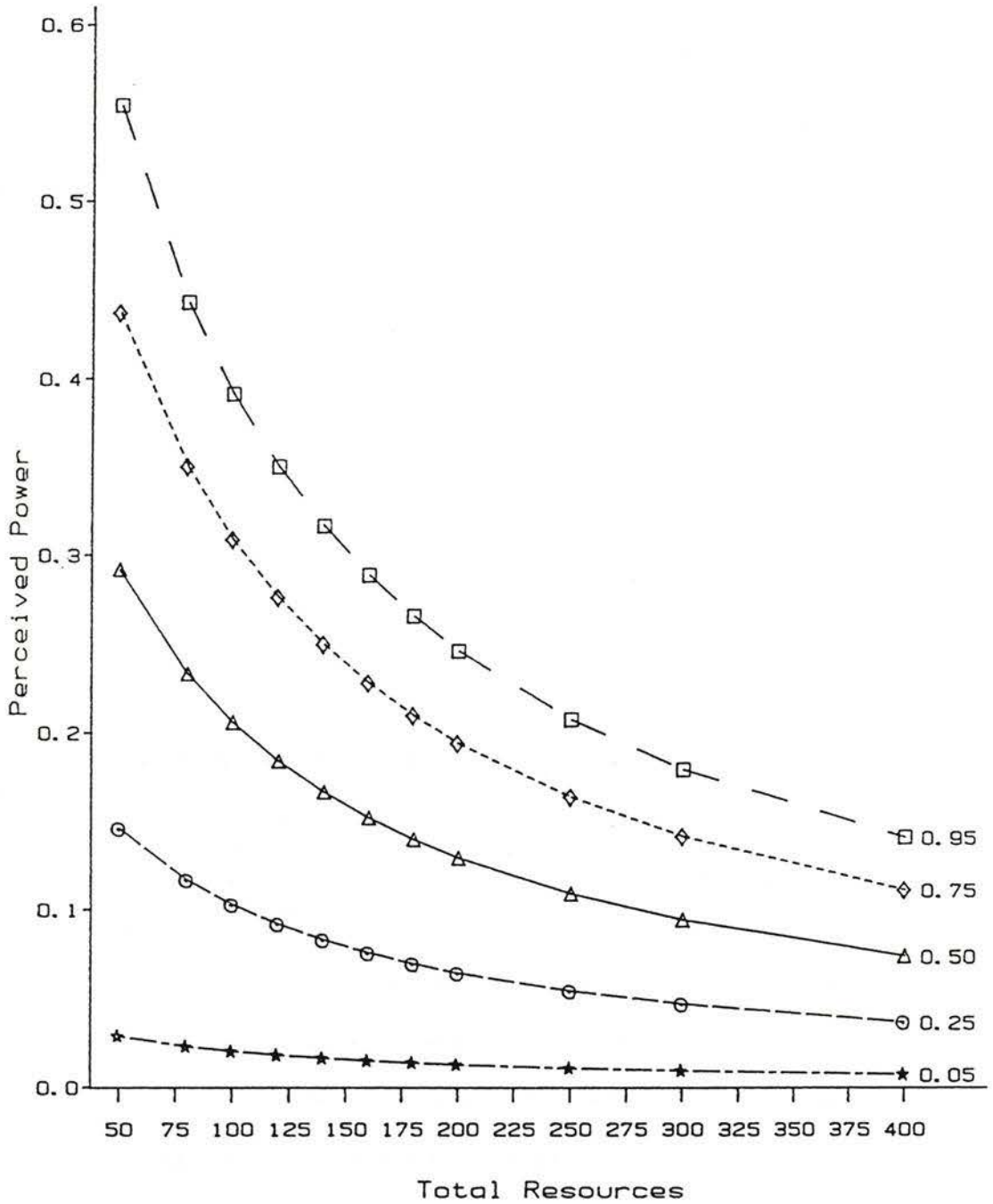
resources of the alliance:

$$PP_x = P_x * [E(T)/(E(T) + R)]. \quad [10]$$

The values generated by this formula decrease as the expected threat relative to the total resources of the dyad increase suggesting that perceived power considers not only  $P_x$  but also how important  $P_x$  is relative to what is needed. When resources are scarce (i.e., when the threat requires a large proportion of available resources), the player with the largest proportion of resources is seen to be more powerful than when resources are abundant. In other words, when each unit of resource is important because the expected threat requires a large proportion of the resource, the more a player holds, the more powerful that player is seen to be. Conversely, when there is an excess of resources (i.e., when the threat requires only a small proportion of the resources), controlling a large proportion does not give a player as much perceived power.

Perceived power can vary from 0.00 to 1.00. The value of PP for players with differing amounts of  $P_x$  given a range of resources are plotted in Figure 4. As Figure 4 suggests, within each bargaining dyad the perceived power of one party relative to the other always reflects the proportion of resources each holds (e.g., in all total resource conditions the player with .75 of the resources has three times as much PP as the player with .25). However, for a constant level of threat, the amount of perceived power attributed to the .75 player when the resources total 100 is greater than when they total 400. It is true that in terms of the ability to determine one's own destiny, a player with .75 of 400 resources is more

Figure 4.



Predicted levels of perceived power for negotiators with differing proportions of resources in alliances with total resources ranging from 50 to 400 units (all values assume a constant threat of  $E(T)=70$ ).

'powerful' than a player with .75 of 100 resources. This ability to control or influence one's own outcomes has been previously accounted for in this model by survival and financial independence. In terms of perceived power, the player with .75 of 400 is perceived to be less powerful than the player with .75 of 100 (when comparing for a common level of threat). This is in line with the definition of power as the ability to control or influence the negotiations. Negotiations are an interactive process and thus perceived power must consider how important a player's resources are in the context of the negotiations. Clearly, when the total resources of the dyad are close to the amount needed to survive (i.e., close to the level of the threat), the player who controls the largest proportion of the scarce commodity would be perceived to be more powerful than a player who controls an equivalent proportion of an abundant commodity.

This definition of perceived power predicts that:

1. Subjective ratings of the relative ability of each player to influence or control the negotiations will vary with the division of resources between them such that when there is an equal division of resources both players will be seen to have the same level of perceived power. As the discrepancy in the proportion of resources held by each party increases, the amount of perceived power attributed to the larger player will increase relative to the perceived power of the smaller player.
2. When perceived power is assessed in an absolute manner, these differences between players will continue but the overall level of perceived power attributed to each will decrease as the ratio

of the threat to the resources (or  $E(T)/(E(T) + R)$ ) decreases.

### Fairness

**Assumption 4:** As a means of maximizing the probability of obtaining the outcome goals, the negotiators will cooperate and their negotiations will be governed by standards of fairness (specifically, the fairness standards of equity and resource scarcity or need).

Although it may not always be explicitly recognized, fairness or justice is a goal that guides many negotiations in modern, Western culture (Zartman & Berman, 1982). In the context of an alliance, fairness can be seen to be an important goal as: (a) alliances exist as cooperative units and it has been demonstrated that fair agreements are reached more readily when there is a cooperative orientation (Deutsch, 1985), and (b) members of alliances usually expect ongoing relations. This expectation encourages cooperation (Ben-Yoav & Pruitt, 1984; Hancock & Sorrentino, 1980; Marlowe, Gergen, & Doob, 1966; Pallak & Heller, 1971). Fairness is a means of producing interactions within the group that will not jeopardize future dealings -- it is an element that fosters effective group cooperation in the present (Deutsch, 1985), and lays groundwork for ongoing cooperative interactions in the future (Pruitt, 1972). The importance of fairness within groups expecting future interaction was demonstrated by Lamm, Kayser, and Schwinger (1982, p. 384) who found that "as possibilities for social interaction increase, so does the influence of social norms for fairness". The importance of fairness within groups has also been suggested by Equity Theory (Walster, Walster, & Berscheid, 1978). This model thus asserts that fairness standards will be used mainly because they promote cooperation and

not only out of an interest in justice. This assertion is in line with the positions of many other theorists who have put forward a number of possible concerns that form the basis for the use of standards of fairness (e.g., Greenberg & Cohen, 1982; Leventhal, 1980; Mikula 1980; Schwinger, 1980).

Distributive Justice Theory offers several definitions or standards of fairness. The three most common to negotiations are: (a) equality -- solutions that are based on equal divisions or 50:50 splits, (b) equity -- the use of a proportional standard that bases solutions on how much a negotiator has (or a player's  $P_x$ ), and (c) need -- the use of a measure of how much is needed as a basis for determining what is fair (Deutsch, 1975; Leventhal, 1976; Pruitt, 1981). In this model the need standard is referred to as resource scarcity (RS) since the negotiators will differ and, it is assumed, will act upon their assessment of each party's economic need. The term resource scarcity is preferred as it is disassociated from other psychological interpretations of need (e.g., as a personality trait).

Various guidelines for when a particular standard of fairness will be applied have been advanced. The common element in these is that the social context is important. There is support for the position that the nature of the group will determine which standard will be applied. Drawing on a series of studies in which the psychological orientations of the subjects were varied, Deutsch (1975) proposed that groups that place an emphasis on economic productivity will use the equity standard, the equality standard will be used in groups focused on social relations, and the need standard

will appear most often in groups in which the primary goal is the development or welfare of its members. As the two primary outcome goals in the crisis game are survival and the maximization of individual payoff it follows that the dominant fairness standards will be equity (given its link to economic considerations) and need (with its relationship to welfare or, in this situation, mutual survival).

As all players want to maximize their outcomes, fairness and cooperation will be implicit in all of the negotiations. Specifically, this assumption gives rise to the following predictions:

1. Fairness will be subjectively rated as an important aspect of the negotiations.
2. This rating will be the same for negotiators in all resource conditions (i.e., fairness will be applied in all negotiations regardless of how the resources are divided between the players, how much total resource is available, or the size of the threat).
3. While conflict may occur, all players will attempt to cooperate.

#### Equity

This model assumes (following on Zartman's (1978) formula/detail theory) that negotiations are based on formulas that are used to *derive specific details for agreements or solutions*. Specifically, Zartman proposed that formulas are usually based on the goal of fairness: "negotiators seek a general definition of the items under discussion, conceived and grouped in such a way as to be susceptible of joint agreement under a common notion of justice" (p. 76). This

suggests that the amount each individual negotiator contributes will be based on a perception of what is fair.

The use of the equity standard suggests that the players will consider the relative resources of each party (or  $P_x/P_y$ ) within the context of the ratio of the threat to the available resources. This occurs since it is the economic context of the negotiations (the resources and the expected threat) that determine the power each player is perceived to have and it is assumed that more powerful players will be expected to contribute more. Consequently, the amount that will be perceived to be a fair contribution (a player's perceived fair contribution or PFC) will be governed by their relative perceived power:

$$\begin{aligned} \text{PFC} &= \text{PP}_x / \text{PP}_y \\ &= P_x * [E(T)/(E(T) + R)] / P_y * [E(T)/(E(T) + R)] \\ &= P_x / P_y. \end{aligned} \quad [11]$$

The strategy produced by this PFC is one in which each player contributes an equal proportion of their resources to the DF (e.g., if one player has three times as many resources (a 3:1 ratio of resources) that player will contribute three times as much to the DF (a 3:1 ratio of contributions)). This strategy is referred to as the proportionate cost (PC) strategy and is defined as:

$$\text{PC}_x = P_x * \text{DF}. \quad [12]$$

The use of resources in this manner (i.e., as a reference in the determination of fair contribution strategies) is similar to the normative resource function proposed by Komorita and Nagao (1983). The model assumes that resources shape the negotiator's expectations

of power and in turn these shape their expectations of fair play strategies.

Lee (1986) proposed another possible contribution strategy for the crisis game -- the equal cost approach in which the equality standard of fairness is applied and each player contributes the same amount (the DF is based on a 50:50 split). This strategy is not included in this model for several reasons, the most pressing of which is the fact that under many conditions the equal cost strategy would produce a DF far below the expected threat and consequently it would run counter to the goal of survival (i.e., the DF would be limited by the maximum amount the smaller player can contribute which could jeopardize survival). Under these conditions Lee suggested a modified equal cost strategy in which all of the resources of the smaller player are contributed and the larger player makes up the difference. This modified strategy does not conform to any of the main fairness standards described above. As it cannot be said to be fair, it is not included in the proposed model given the importance attached to fairness. The only situation in which the players may describe their strategy as equal cost is when it produces predicted contribution amounts that converge with the PC amounts (i.e., when the proportion of resources held by each player is .50/.50).

The specific prediction that follows from this discussion of contribution strategies is:

1. Since individual contribution strategies will be based on the relative division of resources, all players will describe their contribution strategy as PC (when the division of resources is

.50/.50 either equal cost or PC may be used as they are equivalent).

**Corollary 1 -- Desired Financial Improvement**

This model assumes that all players will want to improve their financial position (relative to their proportionate share). This assumption is in sharp contrast to the model proposed by Vitz and Kite (1970) which assumed that only the disadvantaged players would be motivated to improve their position. It is unclear from their model why only this player would strive to diminish the resource discrepancy. Their observations of research using the crisis game lead them to conclude that in fact both parties were implicated.

The rationale for proposing that both negotiators will want to do better than their PC share in this model is based on the goal of financial payoff. It is assumed that both negotiators will subjectively rate payoff as an important goal and that both will want to maximize their individual financial position (a form of economic rationality). As a result, the model predicts that both parties will want the other player to contribute more than their proportional share.

One way of defining a player's desired improvement (DI) is as

$$DI_x = [(PC_x - \text{desired contribution})/R_y] * 100. \quad [13]$$

This equation takes the difference between the amount a player would be expected to contribute using a PC strategy and the amount he/she wants to contribute as a percentage of the other player's resources. The difference between the PC and desired contribution amounts is used as it is assumed that the main strategy used to determine

individual contributions to the DF will be a PC strategy. If neither player expected to improve their position they would contribute their proportional share. When players aspire to improve their financial position they will want to contribute less than this amount.

Consequently, the degree to which each player expects to be able to improve their position will be revealed by comparing predicted and preferred contributions. The amount that one player (e.g., player x) wants to deviate from a PC share has a direct implication for the other negotiator (player y) as player y will have to make up the amount player x wants to undercontribute if the desired DF is to be established. In other words, in these bilateral negotiations improvement in financial position is not achieved by a player independently but rather is obtained at the expense of the other party. This is because the only mechanism by which a player can give less than a PC share of the desired DF is if the other player gives more than a PC share. To reflect this aspect of the negotiations, the desired improvement formula sets the desired improvement of one player as a percentage of the other player's resource.

The value of defining desired improvement in this manner is evident when comparing the desired improvement of players in different resource discrepancies. For example, consider the difference in desired improvement when the resources of the negotiators are divided such that one dyad has a .75/.25 split and another a .95/.05 split of 100 resource units. If the .75 player wants a DF totalling 20 units and wants to contribute 14 of these, the difference between this player's desired and PC amounts is 1.00.

If the .95 player wants a DF totalling 20 units and wants to contribute 18 of these, the difference between these desired and PC amounts is also 1.00. In absolute terms both players want the same amount of improvement over and above their PC share. However, the implications of these desired departures from the PC amounts are very different in each dyad. When a .75 player wants to improve by 1.00 unit he/she is expecting the other negotiator in the alliance with .25 to give an extra 4%. In contrast, a .95 player who wants to improve by 1.00 unit expects the other negotiator with .05 to give an extra 20%. As this demonstrates, what players want by way of improvement in their financial position has implications for the other party. The above equation for desired improvement captures this.

The model assumes that the amount of improvement each negotiator desires is linked to their perceived power (in a similar vein, relative resource and power positions have been linked to desired outcomes and demands in research by Michener and Cohen (1973), Smith and Leginski (1970), and Tedeschi, Lindskold, Horai, and Gahagan (1969)). As perceived power is the perceived ability of a player to exert influence or control over the negotiations, it follows that the players with more perceived power will expect to be better able to influence the negotiations such that they obtain more payoff. Since the wealthy players have more perceived power it is anticipated that they will expect more improvement in their position than the disadvantaged negotiators. As the larger players' perceived power increases so will the amount of improvement they desire. In

contrast, the disadvantaged players will expect some improvement but it is likely that this amount will be small and that it will show little variation as their perceived power changes. It could be predicted that the smaller players' desired improvement would decrease as their perceived power decreases and hence that desired improvement is directly dependent on perceived power. This is not anticipated, however, given the size of the desired improvement the smaller party is predicted to have. In essence, a basement effect will prevent the disadvantaged players' desired improvement from showing much change as their perceived power changes. Players with little perceived power are expected to want some improvement but, as the amount will be a small departure from the PC amount, there is little room for it to vary and still be above their PC share.

More specifically, the following two predictions can be made:

1. All negotiators will desire an improvement in their financial position and therefore all will want to contribute less than their PC share of the DF.
2. The amount of desired improvement will vary with perceived power for the larger party and will be small and constant for the smaller party. When perceived power is equal both will expect only a small improvement in their financial position. As the perceived power of the parties becomes more discrepant, the desired improvement of the larger player will increase. In contrast, the desired improvement of the disadvantaged player will remain constant and will reflect only a small departure from that player's PC share.

3. Desired improvement will vary with the ratio of the threat to the resources. As this ratio decreases the overall level of perceived power decreases and consequently, the amount of desired improvement will also decrease.
4. As will be explained in the following discussion of resource scarcity, the desired improvement of negotiators will change across rounds. In early rounds desired improvement will be higher than in the final rounds (since resource scarcity influences actual bargaining while desired improvement is derived from a priori perceptions of power). The size of this change in desired improvement across rounds will be a function of the amount of resource scarcity.

#### Resource Scarcity

The fairness assumption identifies two fairness standards in this type of negotiations -- equity and resource scarcity (the latter is comparable to the need standard identified by Deutsch (1975)).

Since need or scarcity is the amount that a negotiator is lacking, it may be defined as 1 minus the proportion of resources a player holds. The meaning of this scarcity is determined contextually (as was perceived power) by the relative size of the demand for resources (i.e., the expected threat) and the resources available to the alliance. This means that RS may be defined as:

$$RS_x = (1 - P_x) * [E(T)/(E(T) + R)]. \quad [14]$$

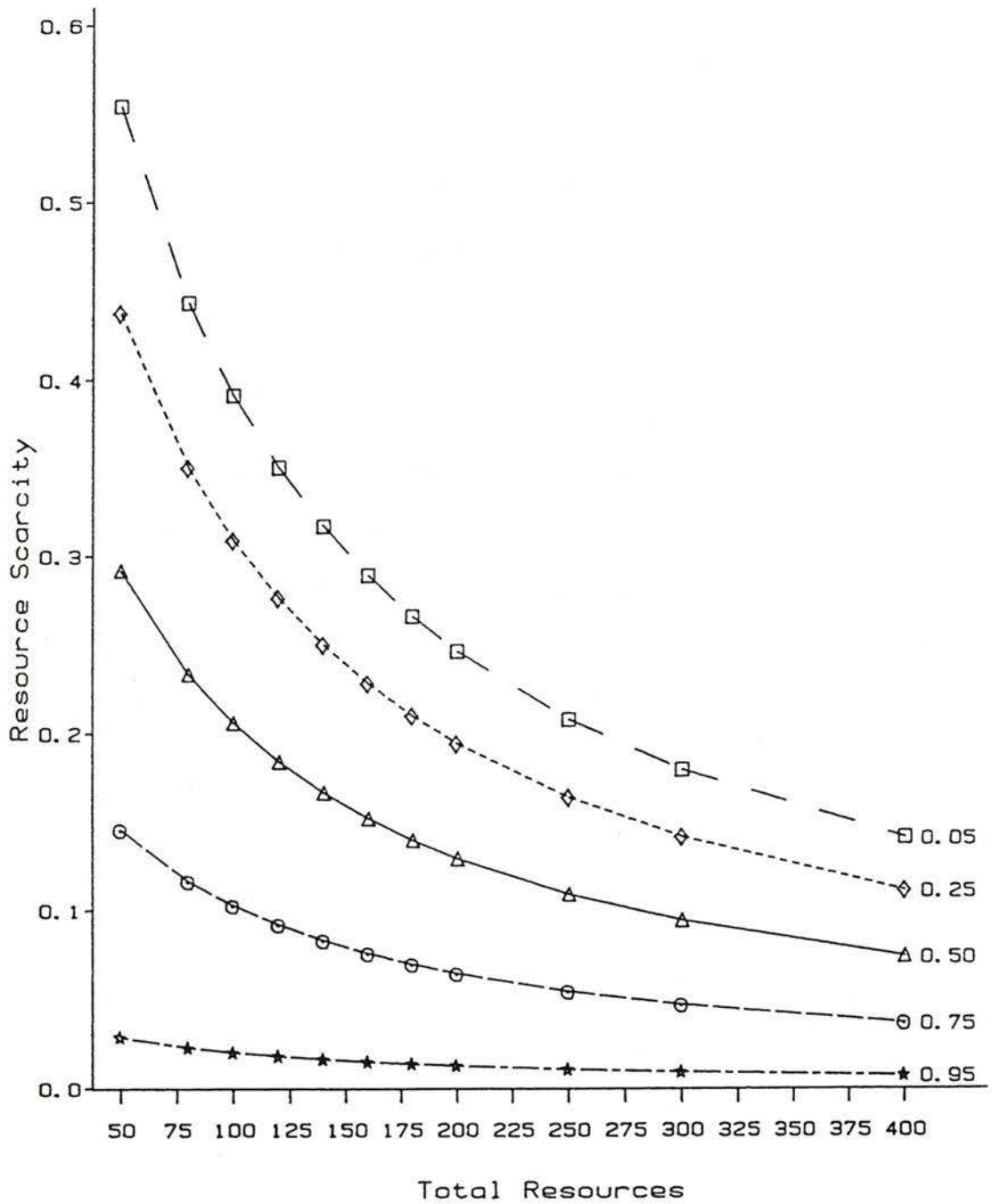
This formula suggests that the resource scarcity of a negotiator will vary inversely with his/her proportion of resources and directly with the ratio of the expected threat relative to the resources. Resource

scarcity is set into the context of the threat and the available resources since the meaning of the scarcity will change with these parameters. For example, if the total resources of the dyad are 1000 and the  $E(T)$  is 70, the resource scarcity of a player holding .25 (or 250 units) of these resources is less significant than when the threat is 70 and the total resources are only 100 (giving the .25 player only 25 units which is less than the amount of the threat). In other words, as  $E(T)/(E(T) + R)$  increases, the threat will have more impact on the negotiators and, as a result, their scarcity will increase in significance.

Resource scarcity ranges from 0.00 to 1.00 with the largest values occurring when a player holds a small proportion of the resources and the expected threat is large relative to the total resources of the dyad. When the expected threat is held constant, the resource scarcity of all players will decrease as the total resources of the dyad increases. Figure 5 illustrates the resource scarcity values for players holding .05, .25, .50, .75, and .95 of the resources when the ratio of the threat to resources is constant and the total resources of the dyad vary.

The model assumes that the equity fairness standard will govern the players individual contribution expectations and the resource scarcity standard will govern their financial outcomes. Expectations are linked to equity on the premise that the relative power of the negotiators will be an important difference between them (in shaping their expectations, the negotiators will make comparisons of their perceived power and hence of their resources).

Figure 5.



Predicted levels of resource scarcity for negotiators with differing proportions of resources in alliances with total resources ranging from 50 to 400 units (all values assume a constant threat of  $E(T)=70$ ).

In contrast, resource scarcity is linked to outcomes as it is anticipated that it is a factor that will come into play primarily during the process of negotiating. The rationale for this use of resource scarcity during the negotiations rests in the need for negotiators to support their proposed solutions. This is derived as follows. When a solution is offered by one party it is evaluated by the other. If a positive evaluation is made, both parties will come to agreement, perhaps with little discussion of it. However, when a solution is challenged, the party who recommended it must be able to justify it in a convincing manner if it is to be accepted. Consequently, the negotiators who can present the best case for their desired solutions will stand the best chance of having them accepted. Resource scarcity provides the economically disadvantaged players with a means of justifying their proposed solutions that is not available to the wealthy party. As a result, the wealthy negotiators will likely find it difficult to logically and fairly support solutions that would offer them a financial advantage. On the other hand, the smaller players can use their need to their advantage -- for them a solution which would improve their financial position can be supported as one that is fair. Consequently, in the crisis game the smaller players can justify contributing less than their proportional share.

This assumption of the role of resource scarcity is supported by the literature on negotiation behavior in cooperative contexts. As the context for intra-alliance negotiations is assumed to be cooperative, it is unlikely that the wealthy players will attempt to

use the potential power associated with their economic strength to coerce the needy players. Coercion and other similar power strategies are common in competitive negotiations but are rarely used in cooperative settings (Tjosvold, Johnson, & Johnson, 1984; Tjosvold, 1988) or when good will between the negotiators is valued (Kipnis, 1976). For that reason, it is the smaller resource holders who will realize the greatest improvement in their position as "in a cooperative, unequal relationship, the moral orientation obligates the more powerful person to employ his power in such a way as to benefit the less powerful one, not merely himself" (Deutsch, 1985, p. 87). Consequently, while equity will guide the negotiators' expectations, resource scarcity will also be used as it is less disruptive of the cooperative, welfare-oriented social context of the alliance (Deutsch, 1975; Peterson, 1987).

Perceived power was defined as perceptions of the ability of a negotiator to influence or control the negotiations. As resource scarcity gives the small players a means of supporting their preferred solutions it can be seen to provide them with power or the ability to influence or control. As this is an actual rather than a perceived form of power it can be referred to as effective power (EP). Effective power is similar to Pruitt's (1981, p. 87) definition of power as "the capacity to influence...to make successful demands...to elicit concessions from the other party". A more specific description of effective power will be developed later in this model.

**Corollary 1 -- Actual Financial Improvement**

To the extent that the disadvantaged players successfully employ their resource scarcity to legitimize solutions that favor them, they will obtain better financial payoffs relative to the wealthy player. Two measures of financial improvement may be described in the crisis game negotiations: (a) undercontributions, and (b) concessions.

**Undercontributions.** One way of conceptualizing actual financial improvement in financial position is to compare how much each player's actual contributions deviate from their PC share. This form of improvement, referred to as undercontributions, is defined as:

$$\text{Undercontribution}_x = [(PC_x - \text{actual contribution})/R_x] * 100. \quad [15]$$

Whereas desired improvement is taken as a percentage of the other player's resources, undercontributions are a percentage of the player's own resources. This is because this measure attempts to describe the outcome of each player relative to themselves.

To illustrate this equation consider a player who has 25 resource units (in an alliance with a total of 100 resource units). If the alliance wants to establish a DF (for a single round) of 16 then the proportionate cost share for the player with 25 units is 4 and for the other alliance member is 12 (a 1:3 ratio of resources and contributions). If the player with 25 units actually contributes only 2 units (with the other player contributing 14) then that player has undercontributed by 8.00% (i.e., by equation 15 the undercontribution is  $[(4 - 2)/25] * 100 = 8.00$ ).

As noted above, improvements in a player's financial position

may be obtained through the use of resource scarcity as a means of justifying a solution that gives the smaller party an advantage in terms of each player's PC share. Given the relationship of undercontributions to resource scarcity, the following predictions may be made:

1. When resources are divided equally between the negotiators, neither will have a resource scarcity advantage in the negotiations and, for that reason, neither will undercontribute.
2. As the resource discrepancy and hence the difference in the negotiators' resource scarcity increases (holding the ratio of threat to resources constant), the wealthy party will overcontribute and the poorer party will undercontribute.
  - 2a. As this pattern is linked to resource scarcity it will be larger in the final round of negotiations (as compared to the first round when a priori expectations dominate).
3. As the ratio of the threat to resources decreases so will the size of the deviations from the PC amounts (even when the resource discrepancy is large) since there will be less resource scarcity.

**Concessions.** Another way of describing how much the negotiators actually improve their financial position is through their concessions. Concessions may be defined as the difference between a negotiator's desired and actual contributions, or as

$$\text{Concessions}_x = \left[ \frac{\text{Actual Cont.}_x - \left( \frac{\text{Desired Cont.}_x * \text{Actual DF}}{\text{Desired DF}_x} \right)}{R_y} \right] * 100 \quad [16]$$

Desired and actual contribution amounts may be set in relation to

different DF sizes. For example, a player may want to contribute 10 units to a 20 unit DF but may actually contribute 11 units to a 22 unit fund. In order to compare these amounts this equation uses the proportion that each contribution amount represents rather than the absolute number of chips. As a result, in this example a concession was not made -- a player who wanted to give 50% of the DF actually gave 50% (in absolute terms, however, this player did contribute one more unit than desired). Following on the assumption that the negotiators will be guided by proportional considerations, concessions are said to have been made only when players give a greater proportion of the DF than they wanted to give.

Since a concession made by one party results in an advantage for the other party, to be complete, the equation needs to reflect the meaning of the concession within the dyad. As was the case with desired improvement, the concessions of one party are measured as a percentage of the other party's resources. In this way, this measure incorporates the impact of changes in one player's financial position on the other player.

Like undercontributions, concessions will vary with resource scarcity. The more resource scarcity a player has, the more likely it is that the other negotiator in the dyad will make a concession. The logic underlying the role of resource scarcity in concession making is the same as that for undercontributions -- players with resource scarcity are in a legitimate position to press for concessions since they can justify solutions that give them an advantage as fair. As these negotiations occur in a cooperative

context, and as fairness is a means of ensuring cooperation as well as a consequence of this context, it follows that appeals to fairness will be effective. In contrast, in competitive contexts an opposite effect has been found -- negotiators in the stronger resource position made fewer concessions (Michener, Vaske, Schleifer, Plazewski, & Chapman, 1975).

The way in which resource scarcity impacts concessions is also supported by the desired improvement concept. The model contends that desired improvement is linked to perceived power and hence to the amount of resources a negotiator has. Players with the most resources are perceived to have the most power and will desire the most financial improvement. Accordingly, these players' desired contributions will show a larger deviation from their PC share (in the direction of undercontributing). However, the undercontributions notion proposes that these wealthy negotiators will actually make overcontributions. As a result, there will tend to be a large discrepancy between the proportion of the DF that they want to contribute (an amount that is less than their PC share) and the proportion that they actually contribute (which is predicted to be more than their PC share). When these factors are brought together they suggest that the larger players will have the biggest difference in their desired and actual contributions and, owing to this, will make the largest concessions.

In contrast, the smaller players have lower levels of desired improvement and the undercontributions prediction asserts that they will give less than their PC amounts. As a result, the proportion of

the DF that they want to and actually contribute are closer together (they are both under their PC amounts). The similarity of these values means that the smaller players will be less likely to make concessions.

There is another important link between desired improvement and resource scarcity. Perceived power is predicted to have a strong impact on desired improvement since both are based on the expectations of a negotiator. In contrast, resource scarcity is predicted to influence the process and outcomes of the negotiations rather than the a priori expectations. It is possible that the effects of resource scarcity will influence the expectations of the negotiators over the course of their bargaining producing a change in their desired improvement. Since it is predicted that resource scarcity will result in the wealthy players contributing more than their PC share, it is plausible that it will also lower their desired improvement over the rounds of bargaining. This suggests that as the negotiations transpire and the wealthy players realize that their contributions are discrepant from their desired level (due to the impact of resource scarcity), they will alter their desired improvement to bring it closer to their actual contribution level (i.e., their desired improvement will decrease). In contrast, the smaller players (who realize an advantage due to their resource scarcity) will not show a decrease in their desired improvement. In fact, if it changes at all it would increase since it is predicted that they will contribute less than their PC share and hence that

they will receive their desired improvement. Their success may result in an increase in desired improvement over the five rounds as they may try to maximize on their advantage. However, as the desired improvement of these players is predicted to be small, it is likely that their levels will change by only a very small amount.

On the basis of these ideas the following predictions can be offered:

1. Since the making of concessions varies with resource scarcity, it follows that when the resource scarcity of the negotiators is equal (i.e., when the total resources are divided between them equally) the concessions of both parties will be equal.
2. As the discrepancy in the resource scarcity of the negotiators increases (holding ratio of threat to resources constant), the size of the concessions made by the wealthy party will increase while the smaller party will not make any concessions.
3. As the total resources of the dyad increase (i.e., as ratio of threat to resources decreases) the size of the concessions made by the wealthy party will decrease because there will be less resource scarcity.

### Outcomes

**Assumption 5:** The level of conflict and the final amount of resources held by each negotiator will be determined jointly by the main elements in the model: average mutual dependency and differences in resource scarcity.

The key elements in this model converge into considerations of how mutually dependent the negotiators are and how discrepant their resource scarcity is. The former is the average of the two players'

survival and financial mutual dependencies (or their average mutual dependence, AMD). The latter is the difference in their proportion of the total resource scarcity of the dyad (or DRS).

### Conflict

In this model the negotiators are assumed to have several commonalities including their goals (i.e., survival and financial payoff) and the use of a PC strategy. This consonance should lead to agreement. However, the negotiators do differ in their economic strength and have different levels of perceived power, dependence, resource scarcity, and effective power. These differences can lead to conflict.

The model assumes that there are two interacting factors that are major contributors to conflict in these negotiations: AMD and DRS. As will be described, these two factors combine in a multiplicative manner to produce the overall level of conflict (C):

$$C = AMD * DRS. \quad [17]$$

### Conflict Due to Mutual Dependence

According to this model, mutual dependence exists when both negotiators need their fellow negotiator to obtain or maximize their goal of survival (SMD) or payoff (FMD). It is predicted that when the negotiators have high levels of mutual dependence conflict will be high since neither can prevail over the other and/or work independently. As a result, either party can stalemate the negotiations. As this mutual dependence can arise from either SMD or FMD (singularly or in combination), the equation for average mutual dependence (AMD) is the averaged sum of both dependencies:

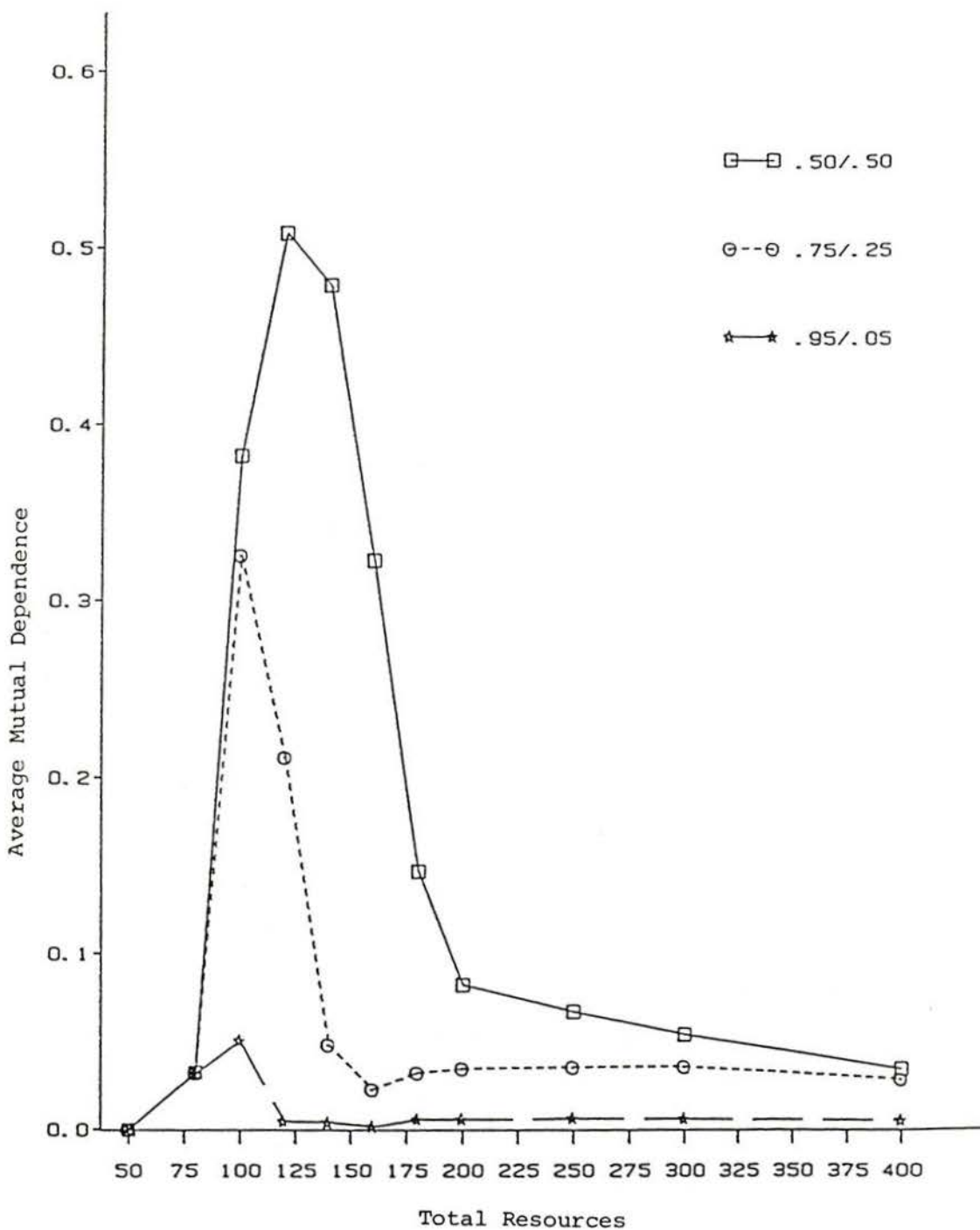
$$\text{AMD} = (\text{SMD} + \text{FMD})/2. \quad [18]$$

Average mutual dependence ranges from 0.00 (when there is no mutual dependence) to 1.00. When AMD is high conflict will be high since the negotiators are denied autonomy or self-determination and, as a result, the process of resolution will likely be more involved and difficult. In contrast, the freedom to work without the constraints of interdependence will lessen the need for interaction between the parties. This will remove some of the opportunities for, or sources of, conflict.

In essence, this equation links conflict to those situations in which the negotiators can succeed if, and only if, they both work together. This situation implies an equality in the ability (or dependency) of each party and accordingly, as Figure 6 suggests, in all total resource conditions, conflict due to AMD is greatest when there is a .50/.50 split of resources. As the discrepancy in the division of resources increases, one party becomes more independent relative to the other and, for that reason, the mutual dependence and conflict of the dyad is lower. Likewise, as the total resources increase (relative to a constant threat) the conflict of the dyad decreases as each party becomes more independent and does not have as great a need to work with the other player to achieve the outcome goals.

Several studies have examined situations in which the negotiators have equal abilities. The difficult nature of negotiations when each party represents an equal threat has been demonstrated in several of these (e.g., studies by Deutsch and

Figure 6.



Predicted levels of average mutual dependence for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice.

Krauss, 1960; Deutsch and Lewicki, 1970; Komorita and Barnes, 1969; Komorita, Sheposh, and Braver, 1968; and Tedeschi, Bonoma, and Novinson, 1970). An opposing position was expressed by Rubin and Brown (1975) who reviewed several studies and suggested that equal power produces more cooperation and more effective bargaining. In their review they included situations in which power was equal because neither party had any power. Averaging these situations with cases in which there is equal bilateral power and then comparing them with unilateral power situations confounds the issue. When the absence of power is removed from consideration, some of the findings they reviewed are closer to the assumption proposed in this model -- high levels of mutual dependency, like equal power, are associated with more difficult negotiations.

This separation of the issues of equality and power has a parallel in this model. The conflict due to AMD assumption suggests that being equal in cases where there is no mutual dependency is different from equality when there is mutual dependency. In line with this, when the total resource of the dyad is low relative to the threat (just as when there is no power in the above studies), the conflict due to AMD is low -- neither party can make a meaningful difference to the outcomes of the other. Since neither can use their position to stalemate the negotiations the equality in the dependencies of the negotiators will not lead to conflict. In other words, it is not the equality of the resource positions of the negotiators per se that is linked to conflict but rather their mutual dependence.

### Conflict Due to Resource Scarcity

This model contends that the resource scarcity standard of fairness has implications with regard to the actual outcomes of the negotiators such that those with more scarcity make fewer concessions and larger undercontributions. In this way, the economically disadvantaged players obtain a better outcome (relative to their initial proportion of resources) than the wealthy players and are described as having more effective power. In effect, the smaller negotiators have more leverage to impact the negotiations and can realize more improvement in their financial position. The conflict due to differences in resource scarcity (DRS) assumption proposes that when the negotiators have comparable amounts of effective power, and receive outcomes in line with their initial positions, there will be less conflict than when they have different amounts of resource scarcity and receive discrepant outcomes. Accordingly, conflict arises out of the difference in the resource scarcity of the negotiators or with

$$DRS = \frac{RS_y}{(RS_x + RS_y)} - \frac{RS_x}{(RS_x + RS_y)}. \quad [19]$$

This equation considers the difference in the relative resource scarcity of the members of a dyad since it uses the proportion of the total resource scarcity that each party has. Given the structure of the game, player y is the disadvantaged party and will always have a level of resource scarcity that is equal to or less than player x. DRS will always be positive and will range from 0.00 to 1.00.

Several studies have found that cooperation decreases when negotiators receive unequal outcomes (e.g., Marwell and Schmitt,

1975; Tedeschi, Lindskold, Horai, and Gahagan, 1969). Similarly, Equity Theory suggests that "reciprocal exchanges breed cooperation and good feelings, gifts that cannot be reciprocated breed discomfort, distress, and dislike...volatile and unpleasant relations are...the result" (Walster, Berscheid, & Walster, 1976, p. 29). In line with these studies, when the negotiators have equal resources their DRS is zero and neither will have an advantage in the negotiations. Their equality in effective power and outcomes should lead to agreement, not conflict. As DRS increases so will the amount of conflict. In the context of the crisis game negotiations, the unequal outcomes generated by DRS place the party who expected to have the most improvement (the wealthy party who, with more perceived power, has higher levels of desired improvement) in the least advantaged financial position. This means that there will be a discrepancy between what the wealthy party expected or wanted to get and what that player actually gets. As DRS increases this imbalance in outcomes and the resulting conflict will also increase. Although they did not address the role of resource scarcity in generating conflict, Vitz and Kite's (1970) observations of conflict can be re-interpreted in this way. They noted that "[Country] A might argue for proportional giving, e.g., two to one, while B might argue that his chips were more valuable to him because he had fewer and thus a three to one ratio would be fairer. This conflict over a fair formula for individual contributions to the defense fund was the basis for most of the intense negotiations generated by 'Crisis'" (p.235).

As DRS is the difference in the proportion of the players' resource scarcity and as this is derived from their proportion of resources, it follows that DRS will be the same as the difference in their proportion of resources. For example, if a player has .75 of the resources that player will have .25 of the total resource scarcity of the dyad and the DRS for the dyad will be .50.

### Overall Pattern of Conflict

In the above discussion the conflict due to AMD and DRS were presented as two separate factors. In practice, they operate simultaneously and the overall pattern of conflict is a result of their joint functioning:

$$C = AMD * DRS$$

These factors are brought together in a multiplicative rather than an additive manner since it is assumed that they must occur jointly for conflict to occur. This use of multiplication follows from the fact that both the mutual dependence and resource scarcity factors alone contain aspects that can increase as well as decrease conflict. In negotiations where it is advantageous for the parties to cooperate, it is anticipated that as a means of cooperating, any factor that leads to agreement will be used to override the conflict generating factor. A multiplicative function accomplishes this whereas the addition of conflict due to AMD and DRS would not.

The manner in which these two conflict factors come together can best be seen by considering examples of situations with varying levels of each. Mutual dependence will generate conflict when it is at a high level (and the negotiators must work together in a

situation in which either can stalemate the negotiations) but can lead to easier agreement when it is low (where one or both parties has enough independence to function autonomously). Likewise, large discrepancies in resource scarcity are associated with conflict (by providing one party with more effective power than the other and producing unequal outcomes) and comparable resource scarcity levels lead to agreement (by producing equal outcomes). If conflict due to AMD is high but conflict due to DRS is low, the overall level of conflict will be low. This occurs since the conflict that AMD generates is modified by the fact that the negotiators have comparable resources and can resolve their differences by appealing to solutions that focus on the similarity of their resources. While they are mutually dependent, neither has more leverage to influence the negotiations and both will likely receive similar, equal outcomes. These factors serve to moderate the potential conflict of their dependence.

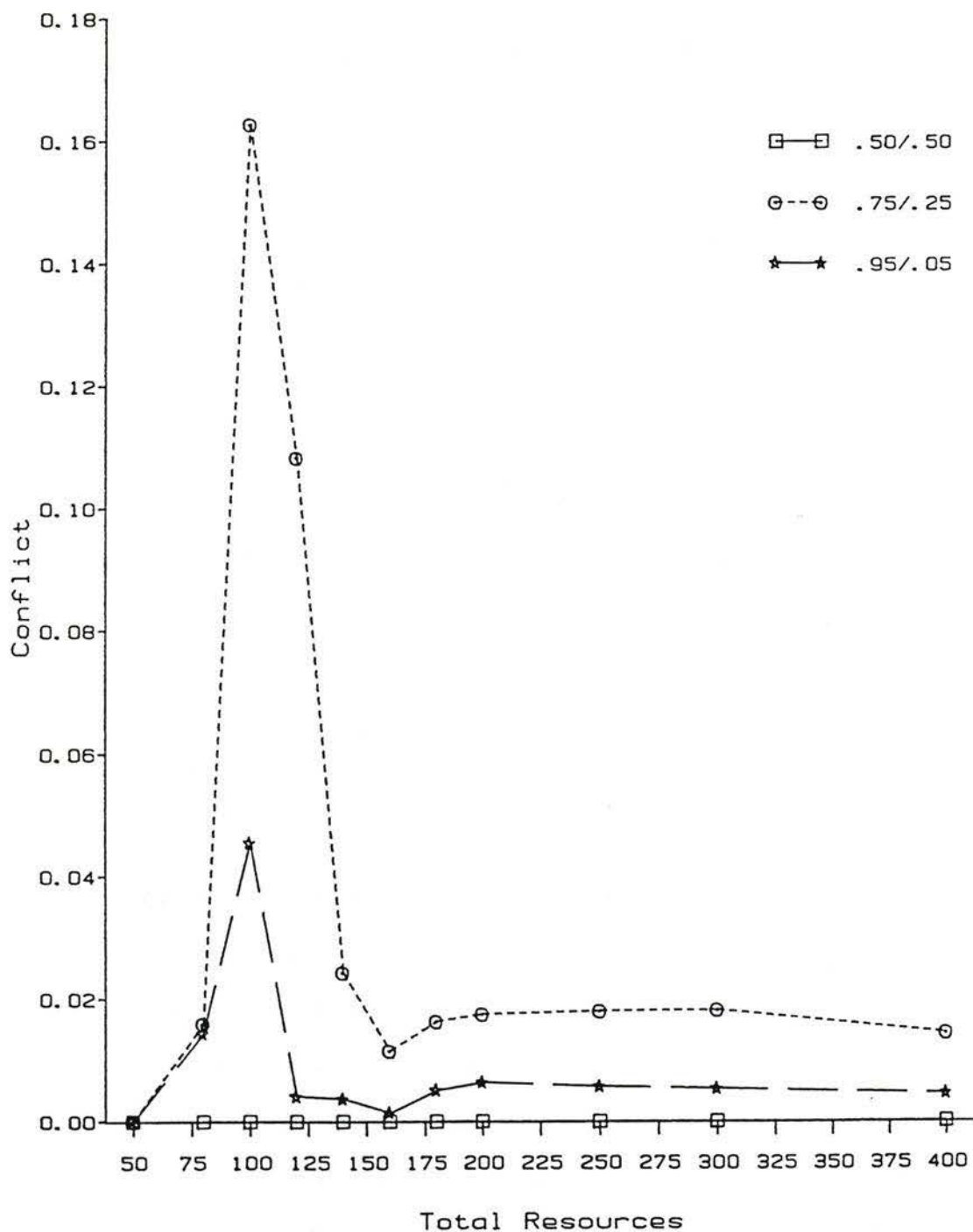
Another illustrative scenario is when conflict due to DRS is high and conflict due to AMD is low. Here there is potential for conflict in the fact that the negotiators have differing levels of effective power and will receive discrepant outcomes. However, as AMD is low at least one party can function independently and can avoid conflict by acting alone. In this situation negotiators with a high level of resource scarcity will be aware of their dependency on their fellow negotiator and, while they may still try to implement their effective power, this will likely be done with caution and in a manner that does not generate much conflict.

When both AMD and DRS are high more conflict will arise as neither the equality of the outcomes or the independence of the negotiators can counter the conflict generated by either factor.

The conflict equation presented above produces the greatest amount of conflict when the total resources of the alliance are comparable in size to the value of the threat and there is a moderate discrepancy in the resources of the negotiators. As was previously described, as the total resources of the alliance increase or decrease relative to the threat, the resource scarcity and dependency of the negotiators decrease, and accordingly, the values of conflict due to AMD and DRS (and hence C) also decrease. Likewise, the dependency and resource scarcity of the negotiators will vary with the division of resources between the negotiators such that when the resources are divided equally, or when a large discrepancy exists, conflict will be low. The conflict predictions for different resource divisions over a range of total resource conditions are illustrated in Figure 7.

This conflict prediction differs from that proposed by Vitz and Kite (1970), Bavelas (personal communication, 1977), and Lee (1986). These models suggest that conflict varies only with the discrepancy in the resources of the negotiators. Specifically, they predict that conflict will follow an inverted-U curvilinear pattern with high levels of conflict found whenever a moderate division of resources occurs. The present model is in agreement with this prediction for only a range of total resource conditions. When the total resources of the alliance are so small that it is unlikely that either the goal

Figure 7.



Predicted levels of conflict for three resource divisions with different total resource amounts. For all values the threat is the roll of four dice.

of survival or payoff can be obtained, this model predicts that conflict will be low (when a completely futile situation exists it would be pointless for the negotiators to engage in conflict). Conflict is also not predicted when a very large resource base exists (Bazerman & Lewicki, 1985) and a small threat is anticipated. Here the amount that is necessary to guarantee survival and the amount that can be gained through the negotiations is so small relative to the resources of the negotiators that again conflict would be pointless.

In summary, this model makes the following conflict predictions:

1. Subjective ratings of conflict by the negotiators will vary with
  - (a) their division of resources (in an inverted-U curvilinear pattern with maximum conflict in moderate discrepancy conditions), and
  - (b) the ratio of the threat to the available resources (with moderate ratios associated with more conflict than small or large ratios).
  - 1a. These ratings will be the same for the economically advantaged and disadvantaged players.
2. Disagreement in preferred solutions is likely associated with conflict since the situations in which conflict is predicted are those in which there is no consonant expectations for outcomes or independence to help produce convergence in the positions of the negotiators. Consequently, it is predicted that the percentage of negotiation rounds in which players state differing amounts for their desired DF will follow the same pattern as the ratings of conflict.

### Final Ratio of Resources

This model describes many aspects of intra-alliance negotiations. Together they predict the overall pattern of conflict. They also predict what the final resource standings of the negotiators will be. The initial ratio of resources is  $P_x/P_y$  or the resources of one player relative to the other. The final ratio (FR) results from the influence of the negotiations on this ratio which derives from the same factors as the total amount of conflict -- AMD and DRS. The product of these factors is standardized in its multiplication by  $P_x$ . In so doing, this equation puts a limit on how  $AMD * DRS$  impacts the proportion of resources the player holds. The equation is:

$$FR = [P_x - (AMD * DRS)P_x] / [P_y + (AMD * DRS)P_x]. \quad [20]$$

Following from previous predictions, this equation predicts that when the players deviate from  $P_x/P_y$  (i.e., when  $(AMD * DRS)P_x$  is not zero) the wealthy player will overcontribute and the smaller player will undercontribute (since  $P_x$  is decreased by  $(AMD * DRS)P_x$  and  $P_y$  is increased). Table 3 gives the predicted final ratios for several resource conditions. These ratios, in line with observations of NATO negotiations, show that the wealthy alliance members tend to bear a disproportionate share of the costs (Olson & Zeckhauser, 1966).

Like the conflict equation, the final ratio considers the major elements in the model (SMD, FMD,  $RS_x$ , and  $RS_y$ ). The final ratio reflects the way in which these impact the goals of survival and payoff, and also how the resources are linked to outcomes. As

Table 3

## Theoretical Levels of Effective Power and Final Ratios of Resources

Condition	Initial Ratio	Effective Power		Final Ratio
		x	y	
R = 50				
.50/.50	1.000	.500	.500	1.000
.75/.25	3.000	.750	.250	3.000
.95/.05	19.000	.950	.050	19.000
R = 100				
.50/.50	1.000	.500	.500	1.000
.75/.25	3.000	.628	.372	1.687
.95/.05	19.000	.907	.093	9.730
R = 160				
.50/.50	1.000	.500	.500	1.000
.75/.25	3.000	.741	.259	2.867
.95/.05	19.000	.949	.051	18.493
R = 300				
.50/.50	1.000	.500	.500	1.000
.75/.25	3.000	.736	.264	2.793
.95/.05	19.000	.945	.055	17.182

Note. For all values the threat is the roll of four dice (or a maximum of 24 for a single round of negotiations or 120 for the five rounds).

R is the total resources of the alliance divided in three ways between Players x and y (the .50/.50, .75/.25, and the .95/.05 conditions).

this equation uses the same factors as the conflict equation it predicts that the proportion won by each party will vary with the amount of conflict such that the higher the conflict, the less the larger player will be able to win compared to the amount predicted by a strict PC sharing arrangement. Therefore, the amount the final ratio deviates from the initial or PC ratio varies with the amount of conflict.

Differences in resource scarcity contribute to the final ratio of resources since actual financial improvement in relative resources has been linked to resource scarcity by way of undercontributions and concessions. The use of AMD in the final ratio equation implies that mutual dependence is also a factor in the amount each party will receive. The final ratios (as listed in Table 3) suggest that there is a relationship between dependency and receiving assistance -- those with more dependency receive the most financial benefit (a similar observation was made by Lerner (1980)).

### Effective Power

The final ratio of resources can be seen as a reflection of the effective power (EP) of the negotiators, or as

$$FR = EP_x / EP_y \quad [21]$$

where  $EP_x = [P_x - (AMD * DRS)P_x]$

and  $EP_y = [P_y + (AMD * DRS)P_x]$

The relationship between effective power and the final ratio of resources suggests that the amount that each player will win is equal to their effective power (or  $W_x = EP_x$ ).

Effective power (or the ability to actually influence or control

the negotiations) is derived from resource scarcity. As DRS increases, the smaller party increases in effective power relative to the larger player (although the larger player is still more powerful overall). This occurs as the smaller players will have more leverage in the negotiations and, as a result, they are able to influence the negotiations to their financial advantage. This assumes, of course, that the smaller negotiators are aware of, and attempt to use, their effective power. While it is anticipated that most will use their effective power, those who do not will receive outcomes more commensurate with their initial ratio of resources.

Mutual dependence is also a factor in the negotiators' effective power. As with DRS, the power changes due to AMD are relative with the large resource holder still retaining more power. The shift in relative power occurs in response to the increasing dependence of the larger party (this is in line with Emerson's (1962) conception of power as a function of dependence). As mutual dependence increases, the larger party loses effective power while the smaller party gains effective power. When the parties are mutually dependent the smaller player gains power since the larger player needs the smaller player's resources -- the smaller player has fewer resources but these resources are important to the outcomes of the negotiations for both parties. In contrast, as AMD increases, the larger players lose effective power as the AMD means that, even though they have a larger proportion of resources, their resources are increasingly insufficient on their own.

This model has divided power into two types -- effective and

perceived power. This division was made on the premise that there is not always a direct relationship between the potential to use power and actually using it. Different types of power may be directed by different factors (Cook & Hegtvedt, 1986). Both effective power and perceived power are determined in part by the resources of the negotiator (i.e., both equations use  $P_x/P_y$ ) and both place these resources into the context of the relationship between the threat and the available resources (perceived power does this directly by using  $E(T)/(E(T) + R)$  and effective power indirectly since AMD is influenced in a similar manner). They differ in that effective power goes beyond perceived power by incorporating factors (AMD and DRS) that impact the process of negotiating. Consequently, the a priori expectations of the players (which are linked to perceived power) differ from their outcomes (which are linked to effective power).

In summary, for the final ratio of resources and effective power the model predicts that

1. The final ratio of resources (or the winnings of each player) will be determined by their effective power (i.e., it will vary with the product of the players' average mutual dependency and differences in their resource scarcity).
2. The amount that the players deviate from  $P_x/P_y$  will follow the same pattern as their conflict.

### Summary

A new model was proposed based on: (a) the outcome goals of the negotiators, (b) the degree to which the negotiators are mutually dependent, (c) power, and (d) the application of standards of fairness. The central concepts in this model are the mixed-motive outcome goals of survival and financial payoff. As the negotiators work toward these goals, the model addresses several intervening factors including perceived and effective power, the fairness standards of equity and need (or resource scarcity), desired and actual improvements, concessions, and interdependence. The final outcomes predicted by these variables are the pattern of defense spending, the ratio of resources left for each negotiator, and the amount of conflict (with conflict occurring when the negotiators are mutually dependent and receive outcomes that are discrepant with their initial relative resources).

The model generates many predictions. To reiterate, these are:

1. Both outcome goals (survival and payoff) will be subjectively rated as important by the negotiators.
2. The importance of these goals is implicit in the structure of the negotiations and, consequently, they will not be affected by changes in the context of the negotiations. As a result, these ratings will be the same for negotiators with any division of resources (i.e., all ratings by players  $P_x$  and  $P_y$  will be the same), or in any economic context (i.e., the ratio of the threat to resources).
3. Survival will be rated as more important than payoff by all

negotiators.

4. Since survival is important, the players will establish DFs above the amount needed to meet the most probable threat (the  $E(T)$ ).
5. As survival is more important than payoff, it follows that the players will establish DFs above the amount that generates the maximum expected winnings (the  $\max E(W)$ ).
  - 5a. The amount by which the players' DF exceeds the DF needed for the  $\max E(W)$  will be determined by their average survival independence.
6. Subjective ratings of the relative ability of each player to influence or control the negotiations will vary with the division of resources between them such that when there is an equal division of resources both players will be seen to have the same level of perceived power. As the discrepancy in the proportion of resources held by each party increases, the amount of perceived power attributed to the larger player will increase relative to the perceived power of the smaller player.
7. When perceived power is assessed in an absolute manner, these differences between players will continue but the overall level of perceived power attributed to each will decrease as the ratio of the threat to the resources (or  $E(T)/(E(T) + R)$ ) decreases.
8. Fairness will be subjectively rated as an important aspect of the negotiations.
9. The rating of fairness will be the same for negotiators in all resource conditions (i.e., fairness will be applied in all negotiations regardless of how the resources are divided between

the players, how much total resource is available, or the size of the threat).

10. While conflict may occur, all players will attempt to cooperate.
11. Since individual contribution strategies will be based on the relative division of resources, all players will describe their contribution strategy as PC (when the division of resources is .50/.50 either equal cost or PC may be used as they are equivalent).
12. All negotiators will desire improvement in their financial position and therefore all will want to contribute less than their PC share of the DF.
13. The amount of desired improvement will vary with perceived power for the larger party and will be small and constant for the smaller party. When perceived power is equal both will expect only a small improvement in their financial position. As the perceived power of the parties becomes more discrepant, the desired improvement of the larger player will increase. In contrast, the desired improvement of the disadvantaged player will remain constant and will reflect only a small departure from that player's PC share.
14. Desired improvement will vary with the ratio of the threat to the resources. As this ratio decreases the overall level of perceived power decreases and consequently, the amount of desired improvement will also decrease.
15. The desired improvement of negotiators will change across rounds. In early rounds desired improvement will be higher than in the

final rounds (since resource scarcity influences actual bargaining while desired improvement is derived from a priori perceptions of power). The size of this change in desired improvement across rounds will be a function of the amount of resource scarcity.

16. When resources are divided equally between the negotiators, neither will have a resource scarcity advantage in the negotiations and, for that reason, neither will undercontribute.
17. As the resource discrepancy and hence the difference in the negotiators' resource scarcity increases (holding the ratio of threat to resources constant), the wealthy party will overcontribute and the poorer party will undercontribute.
  - 17a. As this pattern is linked to resource scarcity it will be larger in the final round of negotiations (as compared to the first round when a priori expectations dominate).
18. As the ratio of the threat to resources decreases so will the size of the deviations from the PC amounts (even when the resource discrepancy is large) since there will be less resource scarcity.
19. Since the making of concessions varies with resource scarcity, it follows that when the resource scarcity of the negotiators is equal (i.e., when the total resources are divided between them equally) the concessions of both parties will be equal.
20. As the discrepancy in the resource scarcity of the negotiators increases (holding the ratio of threat to resources constant), the size of the concessions made by the wealthy party will

increase while the smaller party will not made any concessions.

21. As the total resources of the dyad increase (i.e., as the ratio of threat to resources decreases) the size of the concessions made by the wealthy party will decrease because there will be less resource scarcity.
22. Subjective ratings of conflict by the negotiators will vary with
  - (a) their division of resources (in an inverted-U curvilinear pattern with maximum conflict in moderate discrepancy conditions), and
  - (b) the ratio of the threat to the available resources (with moderate ratios associated with more conflict than small or large ratios).
  - 22a. These ratings will be the same for the economically advantaged and disadvantaged players.
23. Disagreement in preferred solutions is likely associated with conflict since the situations in which conflict is predicted are those in which there is no consonant expectations for outcomes or independence to help produce convergence in the positions of the negotiators. Consequently, it is predicted that the percentage of negotiation rounds in which players state differing amounts for their desired DF will follow the same pattern as the ratings of conflict.
24. The final ratio of resources (or the winnings of each player) will be determined by their effective power (i.e., it will vary with the product of the players' average mutual dependency and differences in their resource scarcity.
25. The amount that the players deviate from  $P_x/P_y$  will

follow the same pattern as their conflict.

### CHAPTER THREE

#### **Empirical Evidence For The Proposed Model of Mixed-Motive Intra-Alliance Negotiation Behavior**

The purpose of this chapter is to provide empirical evidence for the new model of intra-alliance negotiation behavior. The research presented is based on two experiments that used the crisis game varying (a) the relative wealth (or the division of resources) of the alliance members, and (b) the relation of the threat to the total available resources (i.e., what is needed relative to the amount available).

Experiment 1 was essentially an extension and replication of the research by Vitz and Kite (1970). It was designed to assess the model's predictions derived from differences in the resources held by negotiators within an alliance. To this end, this experiment used the crisis game with players with three resource division conditions. It extended the work by Vitz and Kite by testing many more aspects of negotiation behavior. Whereas Vitz and Kite focused only on an assessment of the pattern of conflict, this study examined conflict as well as goals, strategies, perceived and effective power, desired and actual outcomes, and DF spending.

In Experiment 2 the methodology used in the first experiment was repeated for a single resource division condition using a different ratio of threat to resources. This provided a means of investigating how changes in the ratio of threat to resources changes the negotiations. In particular, it tested one of the major new

predictions of the model -- that, contrary to the predictions of previous researchers (A. Bavelas, personal communication, 1977; Lee, 1986; Vitz & Kite, 1970), the pattern of conflict varies not only with the division of resources between the negotiators, but also with the relative size of the threat to the resources.

The model presented in Chapter Two generates many predictions for specific behaviors and outcomes relating to factors within the model (process predictions), and to the outcomes. The key predictions tested in these experiments are that: (a) conflict will vary with the division of resources between the negotiators and with the ratio of needed to available resources, (b) spending on the defense fund will vary with the average survival independence of the two players, (c) desired improvement will vary with perceived power, (d) actual improvement (i.e., undercontributions and concessions) will vary with resource scarcity, (e) perceived power will be determined by resources and effective power by average mutual dependence and differences in resource scarcity, and (f) contribution strategies will reflect a PC approach.

Both experiments used the crisis game (Vitz and Kite, 1970) to simulate intra-alliance negotiations of economic issues. Before considering the specifics of these experiments, the method used in this research of playing the crisis game and the main features of the game will be discussed.

## The Crisis Game

### Method of Playing the Crisis Game

In this game two players negotiate as representatives of countries in NATO (named Countries A and B). The purpose of the negotiations is for the alliance to establish a joint defense fund that protects both members against a threat from an unfriendly country. The negotiators must work out two agreements: (a) the size of the DF and (b) the amount each country will contribute. Once these decisions have been made the alliance is exposed to the threat as represented by the total rolled by four dice. If the DF is less than the threat, the countries are overthrown, they lose all of their resources, and the game ends. If the DF is equal to or greater than the threat, both survive and another round is played. The game continues in this manner until five rounds have been played.

The use of five rounds places the negotiators within the context of ongoing interactions and allows the exploration of multiple strategies and issues. As it has been suggested that there is a propensity for people to change strategies after the first round (Mitchell, 1985), the use of five rounds may accommodate a broader range of negotiation behavior.

The negotiations involve face-to-face interaction by the players and all communication is unrestricted (in contrast to the Vitz and Kite (1970) study which separated the negotiators and manipulated the communication modes).

The negotiators are given the resources of their country in the form of poker chips each said to be worth \$1 billion. Each party is

aware of the resource distribution and therefore the effects of information availability are reduced (Putnam and Jones (1982) offer a review of these effects). At the end of the fifth round, the negotiators are individually paid for their country's remaining resources. The resources provided before the negotiations are all that are available for the five rounds, and they are used without replacement. In contrast to Vitz and Kite's (1970) use of this game, this study did not allow for any carry over of spent resources that exceeded the threat.

The use of dice to represent the threat gives the negotiators a general framework for their defense spending (i.e., it defines the range of possible threats, the most and least likely numbers, and the independence of each round). While rolls of dice are used to describe the properties of the threat, the dice are not actually used during the game. Instead, the experimenter reads the threat for each round from a pre-established list. This method of presenting the threat ensures that all subjects participate in all five rounds since the size of the threat can be altered (using the procedure developed by Vitz and Kite of lowering the threat to one point below the dyad's DF when they would have been overthrown).

### General Features of the Crisis Game

#### The Crisis Game as a Strategy Game

In the crisis game the players are interdependent as what one does is influenced by the actions of the other. In this way this game involves more than chance or skill -- it involves planning, decision-making, and strategies that are based on interactions with,

and expectations about, the other party. As such, the crisis game meets the basic assumptions of a strategy game by producing an experience involving conflict, common interests, rational behavior aimed at the maximization of values, interdependence, and strategies designed to influence the expectations of the opposing party (Schelling, 1960). The interdependence and mutual interests of the negotiators means that the game is not purely competitive (it involves more than getting something at another's expense). Rather, it involves mixed-motives as winning reflects both a cooperative goal (the alliance and not individual players win or lose), and an individualistic goal (attempts to maximize individual outcomes).

#### **The Crisis Game as a Bargaining Relationship**

The crisis game also incorporates the key aspects of a true bargaining relationship in that: (a) it involves two parties, (b) the parties have a conflicting interest, (c) they are joined in a voluntary relationship, (d) their activities concern the division of a resource and the resolution of issues, and (e) they engage in a sequence of proposals and counterproposals (Rubin & Brown, 1975).

#### **Limitations and Advantages of the Crisis Game**

The crisis game is an abstraction of intra-alliance negotiations that is reduced to: (a) the use of two parties with a pre-existing alliance (to control for opportunities in larger groups for the formation of coalitions), (b) the use of monolithic parties (i.e., as the negotiators do not have to report back to their country, and as their decisions do not have to be ratified, there are fewer external constraints or pressures), (c) the absence of time limits, (d) the

use of binding agreements (i.e., as each round does not end until both parties have contributed to the DF there is no opportunity for one side to escape what they have agreed to), (e) third party intervention (or mediation) is not possible, and (f) the resources are monolithic (i.e., only money is involved and not other forms of military resources such as tradeoffs between arms and personnel). While these limits mean that the findings from the crisis game can be generalized to only a portion of negotiation types, they have the advantage of controlling factors that may confound the issues being studied. Each of these limits represent factors that can be addressed in future studies by manipulating features of the game.

While this game is limited, it does have the advantage of involving more than one issue (two types of decisions are made) and more than one type of negotiation (i.e., cooperative and individualistic). Furthermore, as a strategy game it involves more than chance, and it contains all of the basic features of a bargaining relationship. Other advantages are that: (a) it is easily learned, (b) all of its key features can be presented in a short scenario, (c) it uses simple materials, (d) it allows for objective scoring of many aspects of the negotiations, (d) it maintains the players' interest, and (e) its parameters can be easily varied (i.e., resource size, number of players, communication modes, etc.).

The use of simulated negotiations have advantages that extend beyond the specific features of the crisis game. In a simulation it is possible to explore the dynamics of practical problems in ways

that are ethically or practically limited in real life. Lamm, Kayser, and Schwinger (1982) advocated the use of an experimental approach to the study of negotiation behavior for two reasons: (a) it can clarify the processes and outcomes of negotiations so that optimal methods may be identified, and (b) it allows for an analysis of specific variables that contribute to conflict resolution. In this manner, games can be used as models for exploration, teaching, or the demonstration of specific elements that constitute complex real-world situations. Recent research has suggested that laboratory studies can be compared to field studies (Locke, 1986; Shaw, 1981) and that studies using naive negotiators can usually be generalized to experts (Neale & Northcraft, 1986).

### **EXPERIMENT ONE**

The main purpose of this experiment was to examine a number of the model's predictions arising from differences in the relative resources of members of a dyad. The crisis game was used holding the number of total resources constant while manipulating the division of these resources between the players.

#### **Method**

##### **Subjects**

Subjects in this study were 72 male university students (36 dyads) recruited from a psychology subject pool and from appeals made by the experimenter to classes. They ranged in age from 17 to 41 years ( $\bar{M}$  = 21.96, SD = 3.32), and in educational level (current year

of university education) from one to six years ( $\underline{M}$  = 2.38, SD = 0.86). Comparisons of the subjects on these demographic variables by condition revealed no significant differences.

To avoid the effects of existing relationships (Morgan & Sawyer, 1967), all dyads consisted of subjects who did not have a pre-experimental friendship. Data, obtained from an additional four subjects (two dyads), were excluded as one pair were friends and the other deviated extensively from the task. The use of all male subjects overcomes the effects of sex differences in negotiation behavior (e.g., as reported in studies by Benton, 1971; Deutsch, 1985; Tedeschi, Bonoma, & Novinson, 1970). Subjects were paid for their participation on the basis of their individual outcome in the negotiations (range = 0 to \$4.50,  $\underline{M}$  = \$1.46).

### Procedure

Subjects were assigned by block randomization to three conditions varying in the division of 100 resource units (i.e., chips): (a) a .50/.50 split, (b) a .75/.25 split, and (c) a .95/.05 split. This procedure varies from the Vitz and Kite study (1970) in which 75 chips were divided into four conditions (i.e., 39/36, 49/26, 59/16, and 69/6). The use of 100 chips in allocations divisible by five was preferred as it simplified the amounts the subjects based their negotiations on and thereby reduced the opportunity for errors in calculations. The three conditions met the basic requirement to test for the predicted curvilinear conflict pattern.

The subjects were instructed in how to play the crisis game (see Appendix A) and, for clarity, two demonstrations were made: (a) two

dice were rolled twice while aspects of probability were discussed (the four dice were not used to avoid any confounding effects from observing rolls that corresponded to the actual threat range), and (b) examples of multiple ways of obtaining a total of 14 from four dice (the most probable roll) were shown and contrasted with the one way of rolling 4 or 24. To replicate the Vitz and Kite study, numbers comparable to their threat levels were used. For rounds one to five these were: 16, 11, 15, 17, and 12 (as Vitz and Kite used three rather than four dice their threats were: 12, 8, 11, 13, and 9). During the study it was necessary to alter the threat for 14 dyads who otherwise would have been overthrown before completing all five rounds. Any impact of this was likely balanced out as the subjects were randomly assigned to conditions, and the frequency of this change was approximately equal in all conditions<sup>1</sup>.

Players were randomly assigned to represent either Country A or B (where Country A was the wealthy country in the moderate and large resource discrepancy conditions). Before they began their negotiations the subjects completed a short questionnaire designed to obtain demographic data (age and educational level) and measure their perception of how much control or influence they thought each country would have in the negotiations (see Appendix B). They were then given a form (Appendix C) on which they recorded (on a round by round basis) how much: (a) they wanted the DF to be, (b) they wanted to contribute to this DF, (c) the DF was in the last round, (d) they contributed in the last round, and (e) resource they had left. In addition, 30 of the 36 dyads were also asked how they decided their

individual contribution amount for each round. A calculator was made available.

Upon completion of the negotiations a questionnaire measuring self-reports of conflict, the importance of goals, and types of strategies was administered (Appendix D). Three measures were taken of self-reported conflict: (a) conflict over individual contributions (from none to intense disagreement), (b) conflict over DF size (from none to intense disagreement), and (c) overall conflict or difficulty in the negotiations (from not at all to extremely difficult). For all subjective rating scales responses were indicated by drawing a vertical mark through a continuous 13 cm line on which only the end-points were labelled (using opposites such as "Not At All Important" and "Extremely Important").

At the conclusion of the session subjects were paid based on the number of chips they had left (\$.25 per chip).

The experimenter rated the conflict observed in the session using three scales (two that were identical to the conflict over DF and individual contribution scales administered to the subjects, and a general, overall rating scale). The latter differed from the subject's overall scale by focusing on conflict rather than difficulty. An observer was also present in all sessions to time the negotiations and provide conflict ratings.

## Results

The predictions generated by the model fall into two categories: outcomes and process. The former considers the final standing of the

negotiations and outcomes generated by the process variables including conflict, final ratios of resources or effective power, and defense fund spending. Process predictions refer to variables described by the model as a means of producing the final outcomes and include the importance of the negotiators' goals, perceptions of power, fairness, contribution strategies, desired improvement, undercontributions, and concessions.

In reporting the results for these predictions all F statistics will be derived from oneway ANOVAs unless otherwise noted (i.e., as Pillais' or multivariate Fs). All post hoc comparisons will use the Newman-Keuls procedure.

Some aspects of the model were tested using subjective rating scales. The scores for members of a dyad on these scales were not independent and consequently their ratings were combined (i.e., the means of Player x representing Country A, and Player y, the representative of Country B, were used). This was justifiable as MANOVAs comparing five ratings (the importance of the goals of survival and payoff, the importance of fairness, perceived power, and the importance of the resource discrepancy) by player for each condition were not significant. In other words, on each of these five scales the scores of the two players were comparable and consequently the mean score for each dyad was used.

### Outcome Predictions

#### Conflict

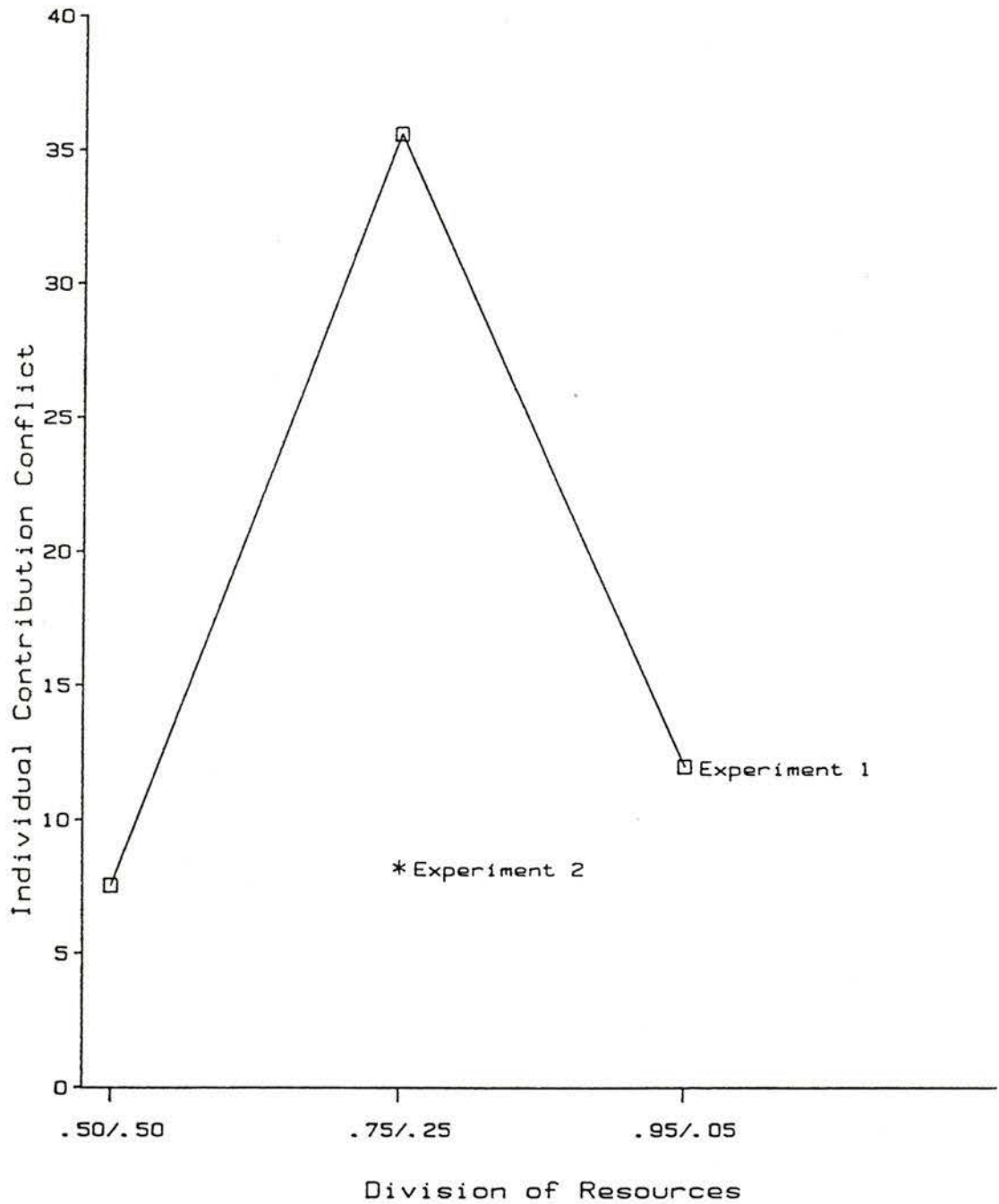
Conflict measures were made using subjective ratings, observer ratings, and measures of disagreement over desired defense funds,

number of proposed solutions, and time.

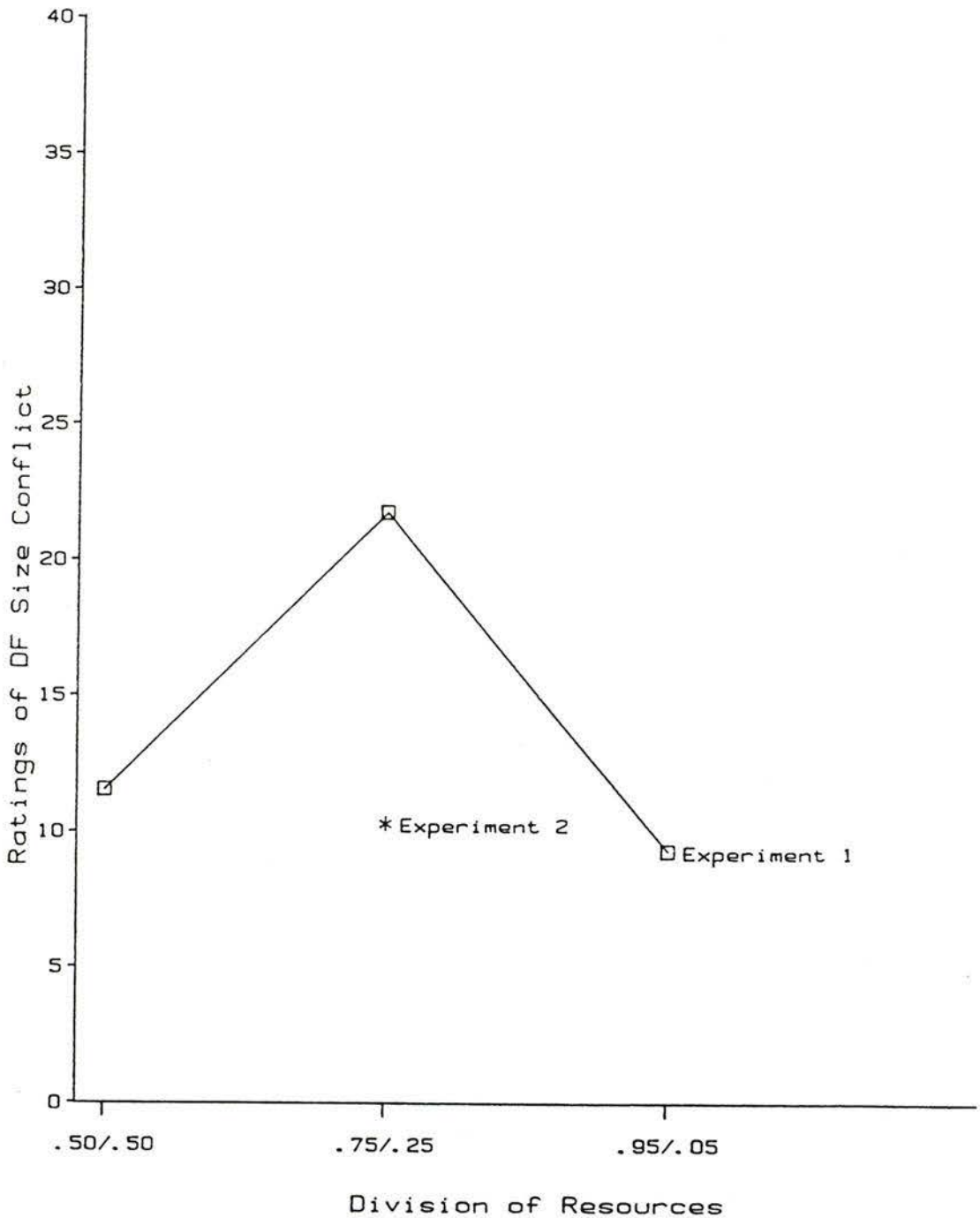
**Subjective Ratings.** Figure 8 (a-c) shows, for each condition, the average amount of conflict rated by the subjects for three scales: individual contribution conflict, defense fund size conflict, and overall conflict. A comparison of these three ratings by condition (using MANOVA) showed that, as predicted [equation 17], conflict differed (Pillais'  $F(6, 64) = 7.13, p < .0001$ ) with the highest ratings in the moderate resource discrepancy condition (the means for each dyad were used as the scores for players in a dyad were not independent, and a MANOVA comparing the players' scores revealed no significant differences). A oneway ANOVA was used to explore each rating. These findings revealed strong support for the predicted conflict pattern with all three scales significantly different across conditions (all  $F's(2, 33) > 12$  with all  $p's < .0001$ , and accounting for 69%, 42%, and 53% of the total variance, respectively). Furthermore, for all three scales the quadratic trend was highly significant (at the .0001 level) and accounted for almost all of the between-groups variance (97% in each case). Post hoc comparisons supported this quadratic pattern with differences identified for the .50/.50 - .75/.25 and the .75/.25 - .95/.05 conditions.

**Observations of Conflict.** As shown in Figure 9 (a-c), for each condition, three ratings of conflict were made by two observers: individual contribution conflict, DF size conflict, and overall conflict. The inter-rater reliability (Pearson  $r$ ) for these were .87, .84, and .92, respectively ( $p < .001$ ).

Figure 8a.

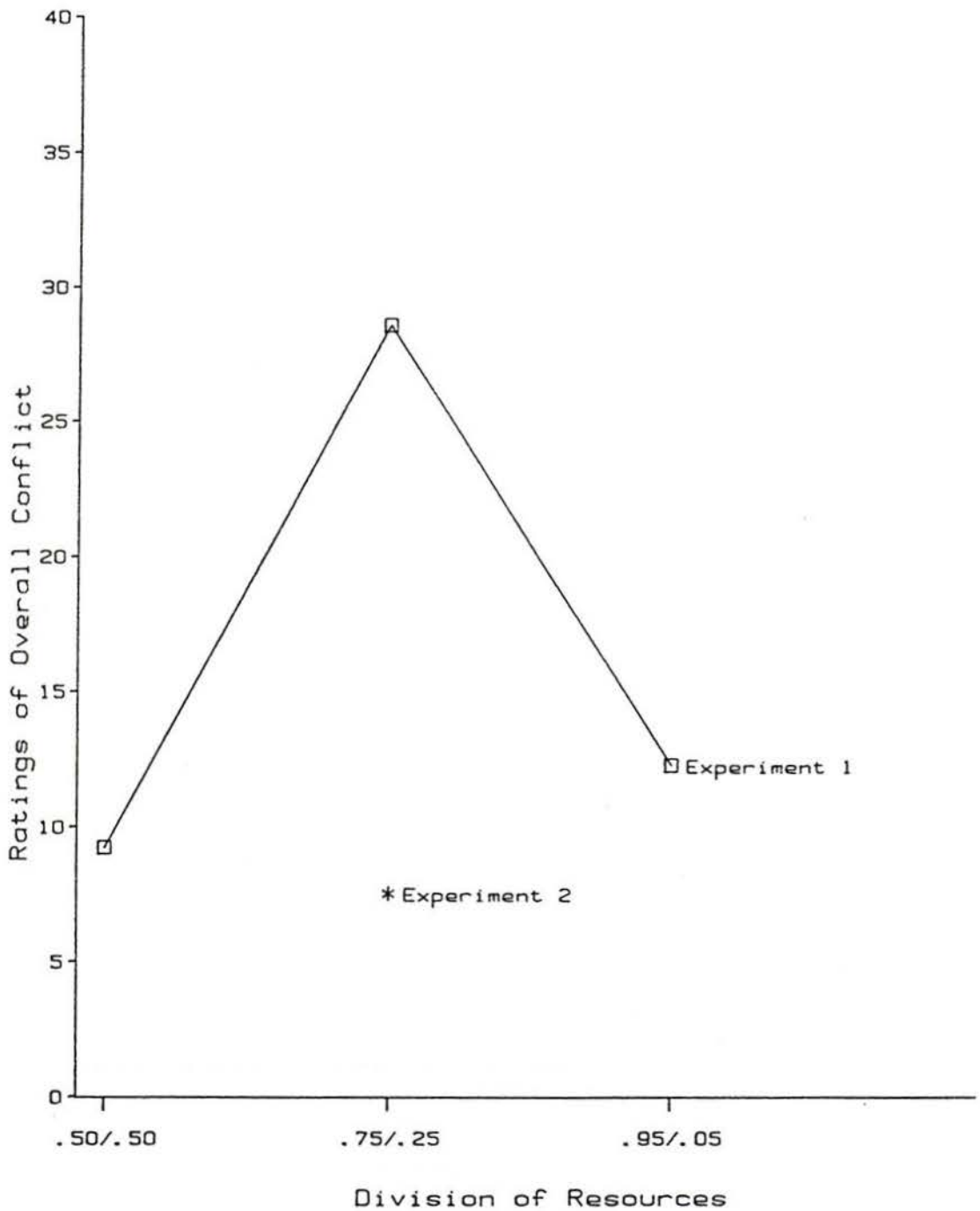


Average ratings (0 to 100) of individual contribution conflict made by subjects in three resource division conditions in Experiment 1 and the single condition in Experiment 2.



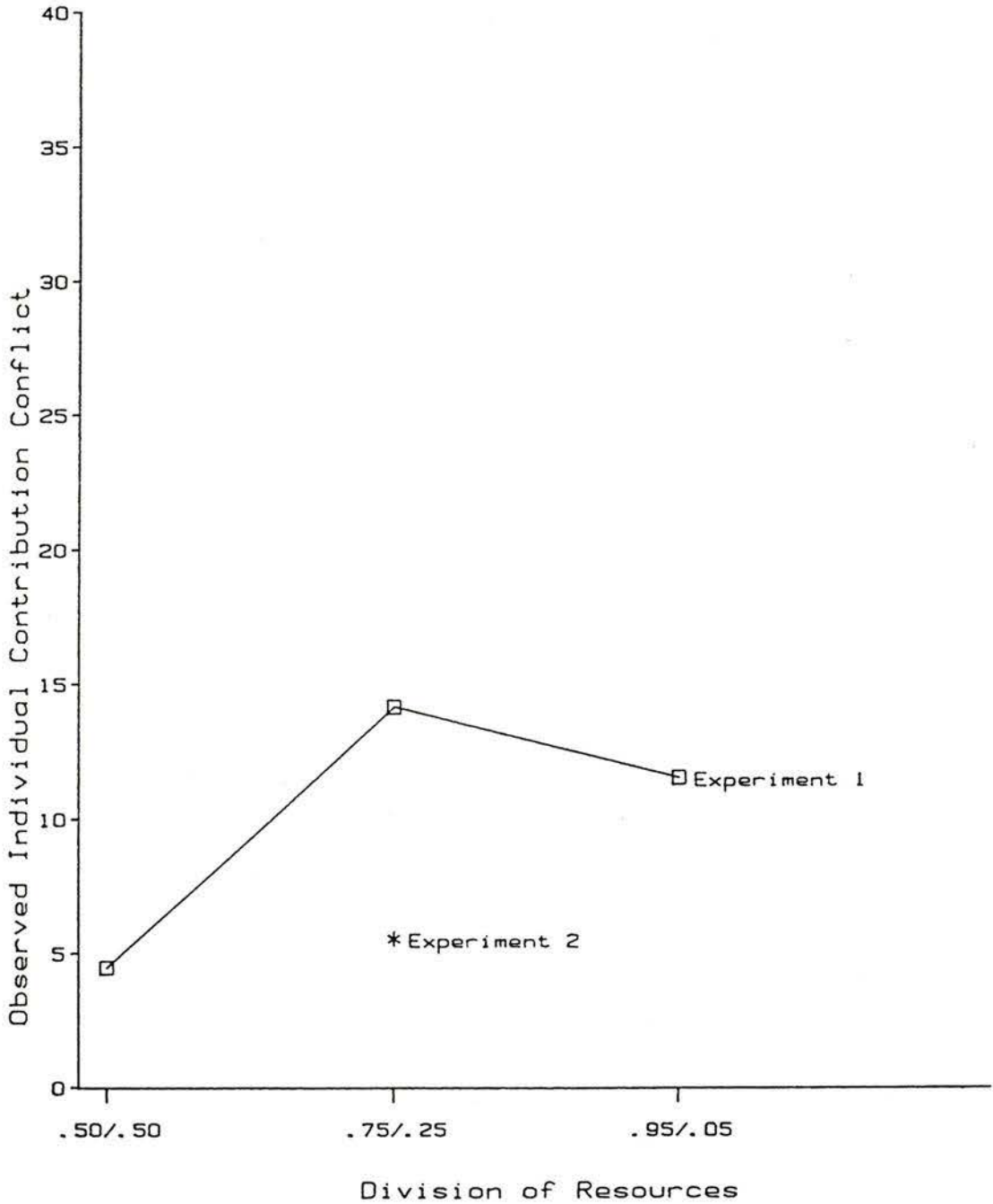
Average ratings (0 to 100) of DF size conflict made by subjects in three resource division conditions in Experiment 1 and the single condition in Experiment 2.

Figure 8c.

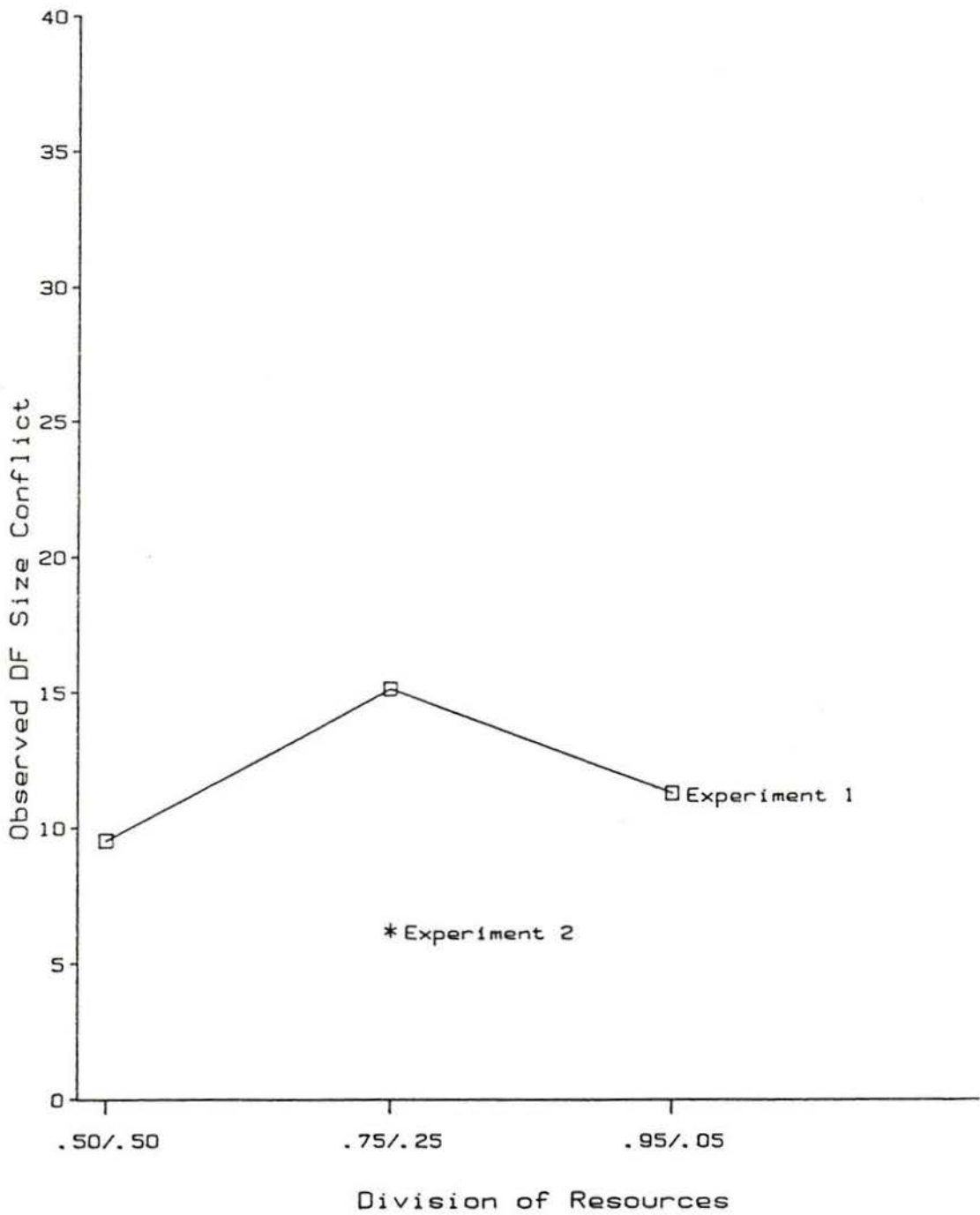


Average ratings (0 to 100) of overall conflict made by subjects in three resource division conditions in Experiment 1 and the single condition in Experiment 2.

Figure 9a.

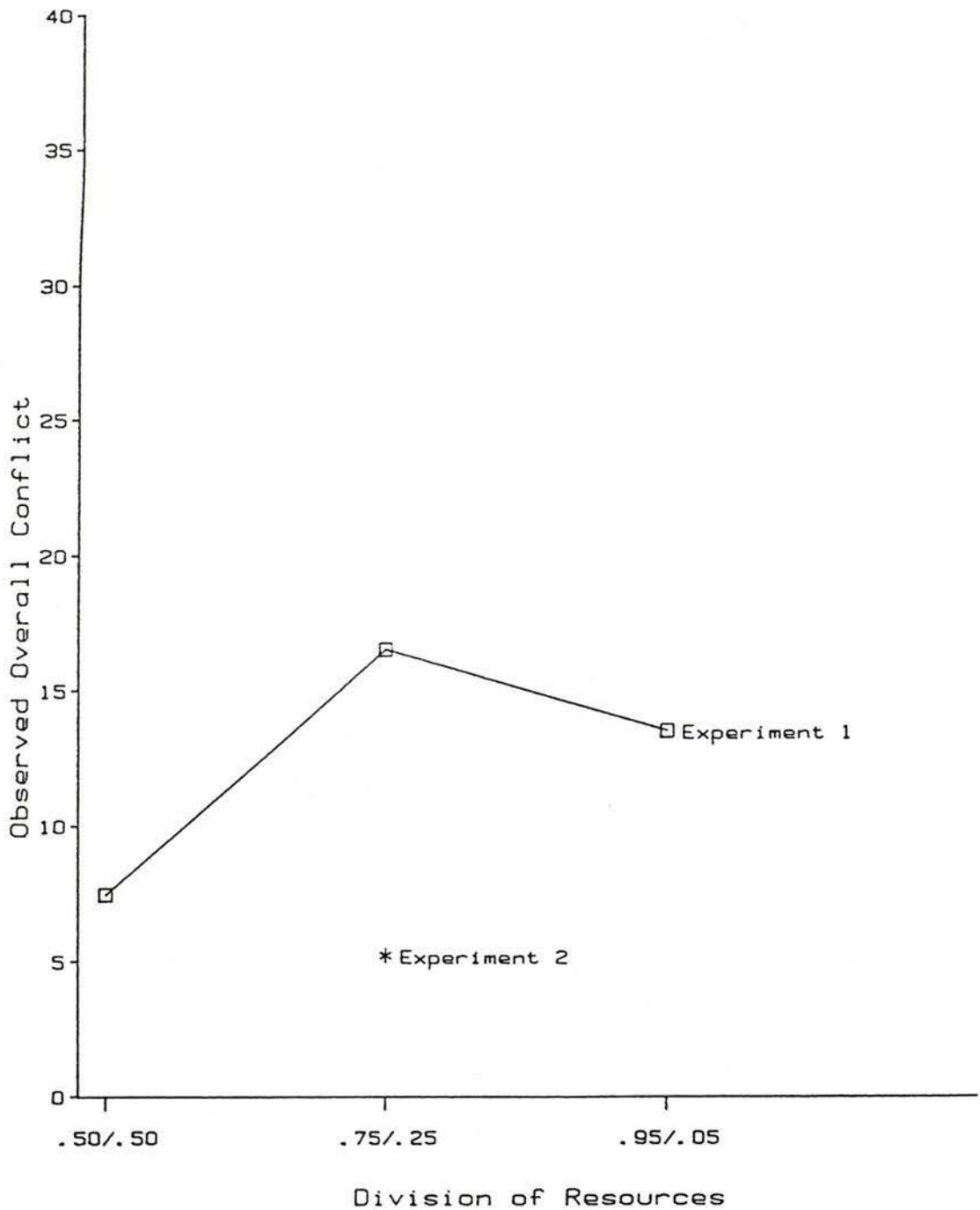


Average ratings (0 to 100) of individual contribution conflict made by observers in three resource division conditions in Experiment 1 and the single condition in Experiment 2.



Average ratings (0 to 100) of DF size conflict made by observers in three resource division conditions in Experiment 1 and the single condition in Experiment 2.

Figure 9c.



Average ratings (0 to 100) of overall conflict made by observers in three resource division conditions in Experiment 1 and the single condition in Experiment 2.

As predicted [equation 17], these ratings followed an inverted-U curvilinear pattern with significant differences between the conditions (Pillais'  $F(6, 52) = 3.04, p < .01$ ) (like the subjective ratings, the mean ratings for the two observers were used as their observations were not independent and there were no differences between them). A oneway ANOVA computed for each variable showed support for the conflict pattern in two of the three observational measures: overall and individual contribution conflict. Overall conflict differed across the conditions ( $F(2, 33) = 5.91, p < .006$ , accounting for 26% of the total variance) with significant linear and quadratic trends ( $F(1, 33) = 5.13, p < .03$  and  $F(1, 33) = 6.69, p < .01$ , respectively) although the quadratic trend accounted for more of the between-groups variance (57% as compared to 43% for the linear). Post hoc comparisons identified differences between all conditions except .75/.25 and .95/.05. Likewise, individual contribution conflict was significant ( $F(2, 27) = 6.02, p < .007$ , accounting for 31% of the total variance) as were both the linear and quadratic trends ( $F(1, 27) = 5.99, p < .02$  and  $F(1, 27) = 6.04, p < .02$ , respectively, with both accounting for 50% of the between-groups variance). Post hoc comparisons again found differences between all conditions except the .75/.25 and .95/.05. DF size conflict did not vary by condition. Overall conflict observations were made for all dyads with the other two measures made for 30 of the 36 dyads. When making comparisons between these variables only those cases with complete data sets were used ( $n = 30$ ).

The ratings by subjects and observers were similar for DF size conflict and individual contribution conflict (Pearson  $r(38) = .71$  and  $r(38) = .66$  respectively,  $p_s < .0001$ ).

**Other Conflict Measures.** In addition to these subjective ratings of conflict, three more objective or behavioral measures were used. It was predicted that each of these would increase as conflict increased [equation 17].

The first measure assessed the differences in desired defense fund size by measuring the frequency of disagreement between the players over the DF they wanted for each round. The average percentages of rounds in which there was disagreement for the .50/.50, .75/.25, and .95/.05 conditions were: 53% (SD = 17.75), 83% (SD = 14.35), and 37% (SD = 22.29), respectively. These means followed the predicted pattern ( $F(2, 33) = 19.77$ ,  $p < .0001$ , accounting for 54% of the total variance) with a significant quadratic trend ( $F(1, 33) = 34.64$ ,  $p < .0001$ , accounting for 88% of the between-groups variance). Post hoc comparisons found significant differences between all conditions.

For the second measure the number of proposed solutions were compared. No differences were found between the conditions: in .50/.50  $\underline{M} = 12.5$ , in .75/.25  $\underline{M} = 13.00$ , and in .95/.05  $\underline{M} = 11.92$ .

Finally, time was measured. The mean length of the five rounds of negotiations (in seconds) for the .50/.50, .75/.25, and .95/.05 conditions were: 475 (SD = 445), 459 (SD = 183), and 1017 (SD = 876), respectively. The differences between the conditions were significant ( $F(2, 33) = 3.64$ ,  $p < .04$ , accounting for 18% of the total

variance) but did not follow the predicted pattern.

### Effective Power/Final Ratio of Resources

The ratio of the players' final resources (i.e., the chips possessed by Player x relative to Player y at the conclusion of the negotiations) were taken as a measure of their effective power relative to one another. As Table 4 illustrates, the empirical final ratios were close to those predicted [equation 20] with 83% of the 36 dyads moving in the predicted direction ( $p < .001$  by the binomial test).

Another measure of effective power was given by the proportion of money a player wins (see Table 4). Comparisons of the players' winnings with the predicted values [equation 21] revealed no significant differences.

As the proportion of the final resources each player wins (i.e., the final ratio of resources) and the amount of conflict are derived from the same factors, it follows that there will be a relationship between them. Table 4 compares the initial and final ratios of resources. This reveals that the amount the subjects deviated from their initial positions was greatest in the condition where conflict was rated the highest (the .75/.25 condition) and lower in the other conditions.

### Defense Fund Spending

Given the importance of survival, the model predicted that players would establish DFs equal to, or greater than, the amount needed to meet the most probable threat (the  $E(T)$  which for five rounds was 70). As Table 5 illustrates, this was the case for all

Table 4  
Predicted and Empirical Financial Outcomes

Condition	Ratio of Resources		Winnings of Player x		Discrepancy between Initial and Final % <sup>c</sup>	Subjective Conflict <sup>d</sup>
	Predicted <sup>a</sup>	Empirical	Predicted <sup>b</sup>	Empirical		
.50/.50	1.00	1.00	50.00%	50.00%	0.00	9.46
.75/.25	1.69	1.79	62.79%	64.23%	10.77	28.69
.95/.05	9.73	8.34	90.68%	89.29%	5.71	11.23
Exp. 2 (.75/.25)	2.87	2.73	74.14%	73.18%	1.82	8.69

<sup>a</sup>The predicted ratio of resources is based on the relative effective power of the players, or  $EP_x/EP_y$ .

<sup>b</sup>Predicted winnings are based on effective power, or  $EP_x = P_x - (TMD * DRS)P_x$ .

<sup>c</sup>Difference between the initial and final percentage of resources.

<sup>d</sup>Subjective conflict is the average of the three subjective ratings (0 to 100) of conflict.

Table 5  
Defense Fund Size<sup>a</sup>

Condition	DF Size	DF - max E(W) <sup>b</sup>	ASI <sup>c</sup>	Total Winnings <sup>d</sup>
.50/.50	86.00 (5.86)	0.00	.0001	7.00 (2.87)
.75/.25	87.17 (3.16)	1.17	.0647	6.29 (2.91)
.95/.05	91.33 (6.20)	5.33	.3788	4.29 (5.34)
Exp. 2	103.12 (8.07)	8.12	.5000	28.44 (15.37)

<sup>a</sup>Entries are means followed by standard deviations in brackets.

<sup>b</sup>Difference between the average DF and the DF needed to maximize expected winnings (Experiment 1 max E(W) = 86, Experiment 2 max E(W) = 95).

<sup>c</sup>Average Survival Independence =  $(SI_x + SI_y)/2$ .

<sup>d</sup>Total winnings are the number of unspent chips players possess at the end of their negotiations (i.e., the average payoff).

conditions and, as the data for individual dyads revealed, even the lowest DF (of 73) exceeded the E(T).

On the basis of the importance of survival, the model also predicted that players would sacrifice payoff to establish higher DFs (to increase their probability of survival). As Table 5 reveals, the model's prediction that the players' DF would exceed the DF that generated maximum expected winnings (or max E(W) which was 86) was supported. The model predicted that the amount of this excess would be linked to the average survival independence of the players [equation 2]. In this study the average survival independence of the two players increased across conditions and, as Table 5 shows, so did the average DF ( $F(2, 33) = 3.42, p < .04$ , accounting for 17% of the total variance). As predicted, the linear trend was significant ( $F(1, 33) = 6.19, p < .02$ , accounting for 90% of the between-groups variance) and post hoc comparisons found a difference between the .50/.50 and .95/.05 conditions. The amount that the DF in each condition varied from the max E(W) was also examined: (a) for the .50/.50 condition average survival independence was essentially zero and, as this predicted, there was no difference between the average DF and the max E(W), (b) in the .75/.25 condition there was more average survival independence and accordingly a larger DF although it was not significantly greater than the max E(W), and (c) in the .95/.05 condition there was the highest level of average survival independence and a DF that exceeded the max E(W) ( $t(11) = 2.98, p < .01$ ). In all, these findings support the predicted pattern of DFs.

### Process Predictions

Process predictions were made for the intervening variables that contributed to the outcomes presented above. These predictions addressed the negotiators' goals, perceptions of power, and use of fairness standards.

#### Goals of the Negotiators

After the negotiations the importance of the outcome goals (survival and payoff) was rated (from not at all to extremely important). Summary data (presented in Table 6) revealed that all means were above the midpoint suggesting that, as predicted, both goals were important. These ratings did not vary by condition. The overall means for these goals were compared and, as predicted, survival was given a higher importance rating ( $t(35) = 7.21$ ,  $p < .0001$ ). The data for individual subjects revealed that 72% rated survival as more important ( $p < .0002$  by the binomial test).

#### Perceived Power

Before their negotiations the subjects indicated who would have the most control or influence (using a scale with end-points labelled "Country B will have the most control" and "Country A will have the most control"). The higher the score, the more power Player x was perceived to have relative to Player y. The means reported in Table 6 supported the prediction [equation 10] that perceived power would vary linearly with the division of resources (specifically, that relative levels of perceived power would reflect the players' relative resources). The perceived power of Player x relative to y increased from the .50/.50 to the .95/.05 conditions ( $F(2, 33) =$

Table 6

Ratings of Goals, Perceived Power, Fairness, and Importance of the Resource Discrepancy

Condition	Goals		Perceived Power of Player x <sup>a</sup>	Fairness	Importance of Resource Discrepancy
	Survival	Payoff			
.50/.50	76.08 (13.38)	53.23 (18.54)	49.61 (2.61)	76.62 (15.92)	66.15 (15.77)
.75/.25	81.15 (10.00)	53.85 (14.77)	69.69 (4.62)	70.15 (13.92)	78.00 (10.54)
.95/.25	84.00 ( 5.46)	60.46 (17.62)	80.85 (5.85)	75.23 (12.15)	83.69 (63.85)
Exp. 2 (.75/.25)	86.62 (15.00)	60.69 (22.23)	67.46 (10.31)	72.08 (20.08)	81.00 (15.46)

Note. All entries are scores obtained from subjective rating scales ranging from 0 to 100 and are reported as means followed by standard deviations in brackets.

<sup>a</sup>This is the average perception (of the two players) of the relative power of Player x.

146.05,  $p < .0001$ , accounting for 90% of the total variance). Both the linear and quadratic trends were significant (for the linear  $F(1, 33) = 284.30$ ,  $p < .0001$ ; for the quadratic  $F(1, 33) = 7.79$ ,  $p < .009$ ) but clearly, as predicted, it was the linear trend that dominated as it accounted for 97% of the between-groups variance. All conditions differed significantly.

While the perceived power attributed to the larger player increased with increases in resources, the empirical values deviated from the predicted values [equation 10] in the .75/.25 and .95/.05 conditions (see Figure 10). These differences were significant (for the .75/.25 condition  $t(11) = 3.99$ ,  $p < .002$ ; for the .95/.25 condition  $t(11) = 8.44$ ,  $p < .0001$ ).

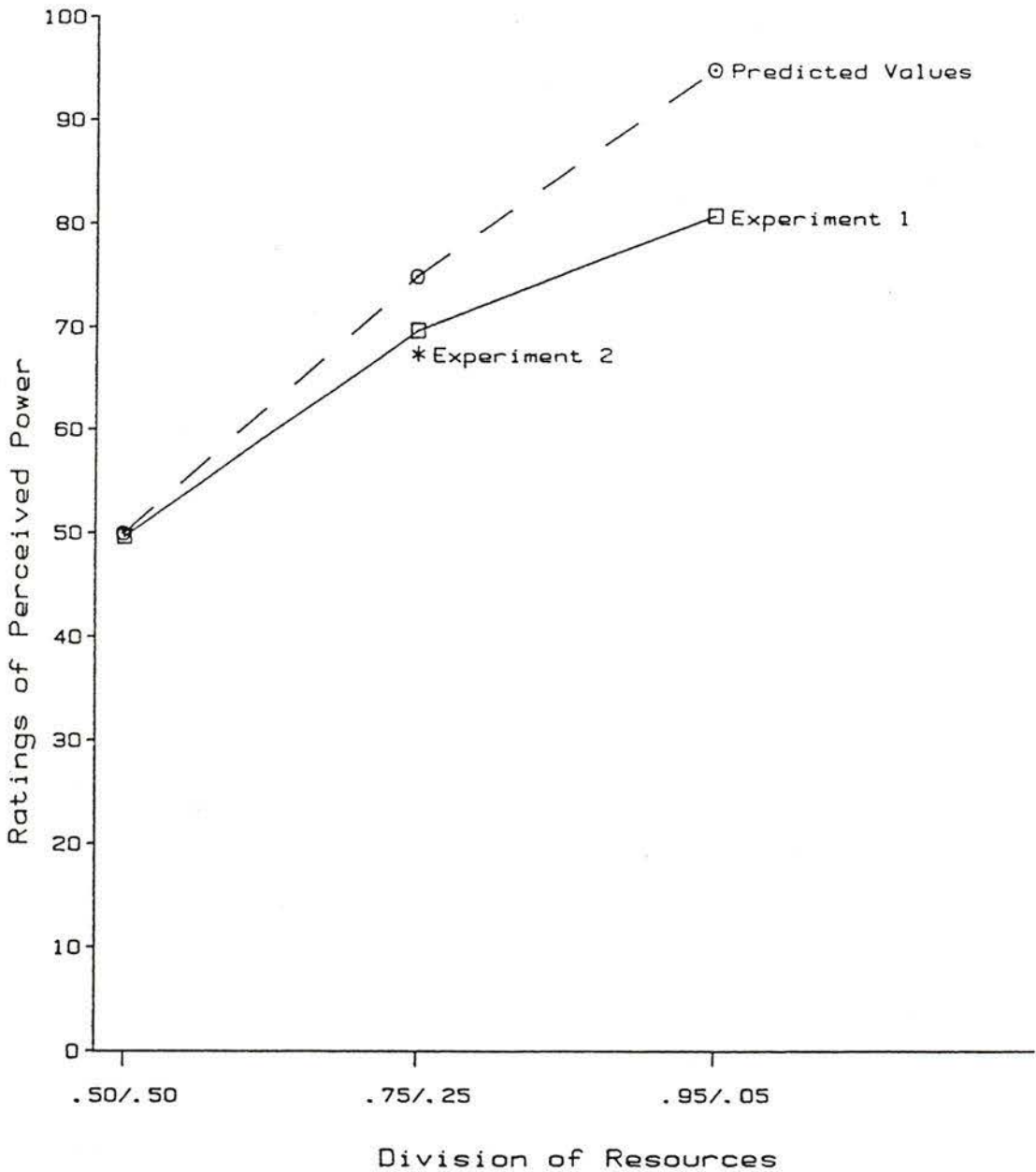
Comments made by subjects generally supported the assumption that perceived power is linked to resources. Common statements were: "the guy with the most cash has the most control" and "A has relatively most control (3/4) -- based on our amounts of chips".

### Fairness

The model suggested that two fairness standards would be used: (a) the equity standard which was linked to individual contribution strategies and desired improvement, and (b) the resource scarcity standard which was linked to undercontributions and concessions. Results are presented first for the importance of fairness and then for the variables associated with each standard.

At the conclusion of the game the players rated the importance of fairness to their negotiations (from not at all to extremely

Figure 10.



Average ratings of perceptions of relative power made by subjects before the first round of negotiations for the three resource division conditions in Experiment 1 and the single condition in Experiment 2. Zero indicates that Player y has the most control and 100 that Player x has the most control over the negotiations.

important). As Table 6 shows, the high ratings for all conditions indicated that it was judged to be important and that these ratings did not vary by condition. Only nine subjects (12%) rated fairness below the midpoint of the scale. Its importance was also evident in the subjects' written comments. Of 30 dyads, 11 mentioned fairness explicitly. This is a fairly significant proportion given that the item did not prompt for this type of response (it asked how individual contributions had been calculated) and no previous items or instructions had mentioned fairness. Representative statements were: "it is proportionately fair", and "even, its fair and we both know it". Observations of the sessions suggested that virtually every group explicitly invoked fairness in their negotiations (if not in writing, then verbally) and that all groups cooperated.

**Equity -- Individual Contribution Strategies.** After the negotiations subjects indicated their main contribution strategy by selecting among the following alternatives: an equal cost strategy, a proportionate cost (PC) strategy, and an open category (see Table 7). While all 24 .50/.50 players described an equal cost strategy, in this condition equal cost is equivalent to a PC strategy [as described by equation 12]. Collapsing this strategy with the PC shows that over 86% of all subjects described a PC approach as predicted.

A similar pattern of results was found in the written comments of the subjects. Of 30 dyads, 28 described either an equal cost or a PC strategy (equal cost was described by all dyads in the .50/.50 condition while the PC strategy appeared in the comments of all dyads

## Individual Contribution Strategies

Condition	Strategy		
	EC <sup>a</sup>	PC <sup>b</sup>	Other
.50/.50	24 (100%)	0	0
.75/.25	0	23 (95.8%)	1 (4.2%)
.95/.05	0	15 (62.5%)	9 (37.5%)
Exp. 2	0	15 (93.8%)	1 (6.3%)

<sup>a</sup>EC = Equal Cost (a 50:50 division of DF costs).

<sup>b</sup>PC = Proportionate Cost (each negotiator gives an equal percentage of his resources).

in the .75/.25 condition and in 8/10 in the .95/.05 condition). These comments showed more adherence to the equal cost and PC strategies than the questionnaire item, probably because the questionnaire item (administered after the negotiations) may have been influenced by actual bargaining and resource scarcity while the written comments (made for each round) contained both a priori expectations regarding strategies (in round 1) and strategy as it was influenced by the negotiations. As a result, they incorporated both strategy as a guide for contributions and actual strategies. The prediction focused on the former and consequently, the written comments may be a better indicator.

**Desired Improvement.** Desired improvement is the difference between the amount a player wanted to contribute and that player's PC share (expressed as a percentage of the other player's resource as it is this player who is expected to make up this amount) [equation 13]. Players indicated their desired contribution amounts before each round. As Table 8 indicates, the means for all conditions revealed that improvement in financial position (over their PC share) was desired. The data for individual subjects also supported this prediction: 75% wanted to give less than their PC amount whereas only 24% wanted to give exactly their PC amounts and 1% more than their PC share ( $p < .0001$  by the binomial test).

The model predicted an interaction between players and conditions with equal amounts of desired improvement for players in the .50/.50 condition, an increase in Player x's level from the .50/.50 to .95/.05 conditions, and no change in Player y's desired

Table 8  
Desired Improvement

Condition	Player	Deviation from PC	Desired Improvement
.50/.50	X	0.46 (0.62)	0.92% (1.24)
	Y	0.46 (0.62)	0.92% (1.24)
.75/.25	X	2.69 (1.49)	10.75% (5.96)
	Y	1.17 (0.60)	1.56% (0.80)
.95/.05	X	0.85 (1.03)	17.08% (20.63)
	Y	0.95 (0.89)	0.99% (0.92)
Exp. 2	X	1.09 (5.01)	2.74% (12.53)
	Y	1.94 (2.59)	1.62% (2.65)

Note. Desired Improvement is defined as the difference between a player's desired contribution and proportionate share of the DF expressed as a percentage of the other player's resources, or

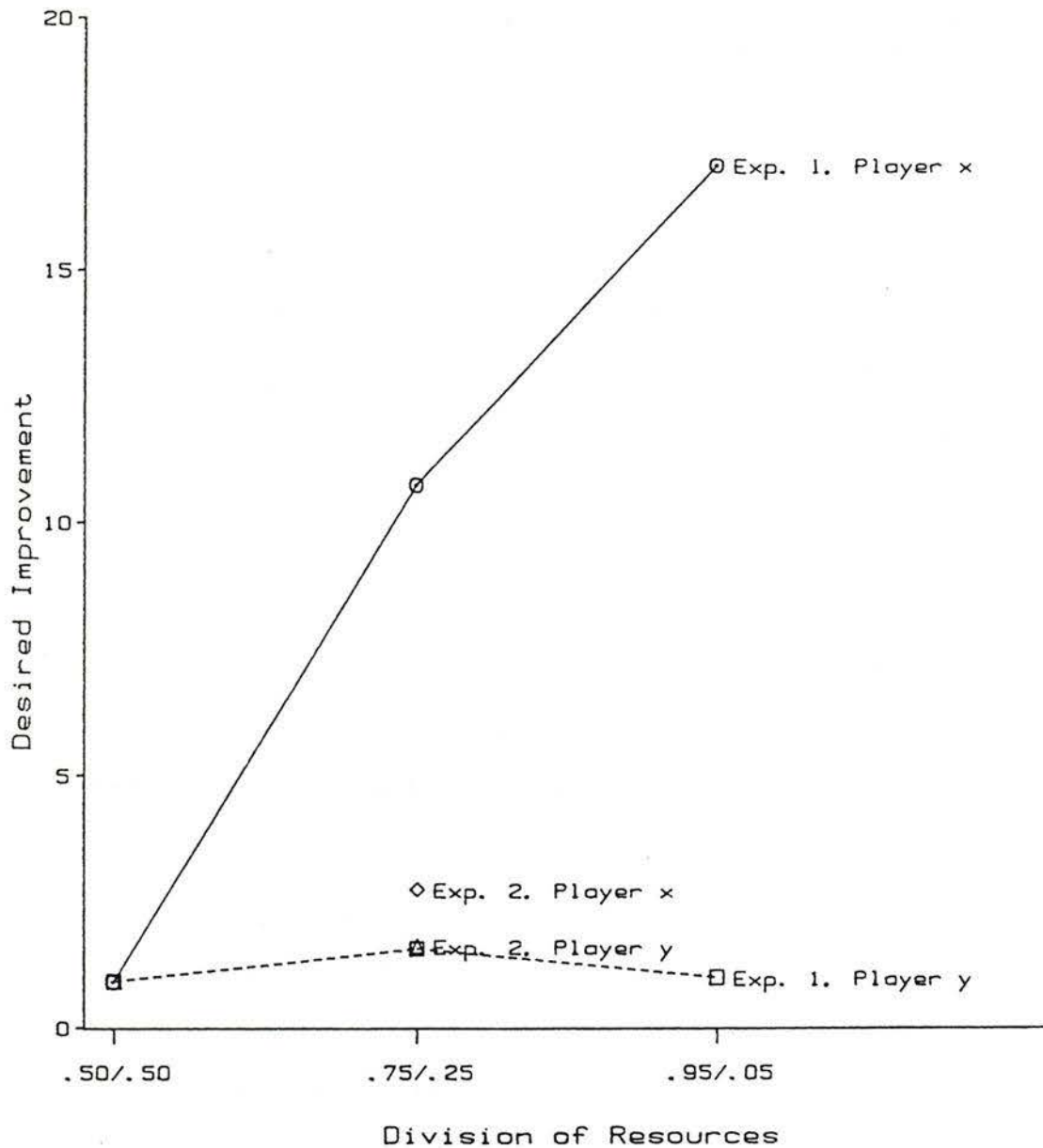
$$DI_x = [(PC_x - \text{desired contribution})/R_y] * 100.$$

All entries are means followed by standard deviations in brackets.

improvement. As Figure 11 illustrates, this pattern was found. A MANOVA comparing the desired improvement for each player by condition (with player as a repeated, within-subjects factor) found differences between players ( $F(1, 33) = 16.28, p < .0001$ ), conditions ( $F(2, 33) = 5.30, p < .01$ ), and an interaction between players and conditions ( $F(2, 33) = 4.98, p < .01$ ).

For Player x the predicted increase in desired improvement was found ( $F(2, 33) = 5.16, p < .01$ , accounting for 22% of the total variance). The linear trend was significant ( $F(1, 33) = 10.17, p < .003$ ) and accounted for 98% of the between-groups variance. Post hoc comparisons revealed differences between the .50/.50 and .95/.05 conditions. As predicted, the comparable analysis for Player y was non-significant.

The model further predicted that desired improvement would vary across rounds with high levels found where the players' a priori expectations had their strongest effect (the first round) and low levels following opportunities for actual bargaining (the last round). Specifically, it was predicted that when the players' resource scarcity was equal, their desired improvement scores would be constant across rounds (as there would be no resource scarcity influence). Where differences in resource scarcity exist, the desired improvement of Player x would be greater in round one than round five with the opposite pattern for Player y (however, given the size of y's desired improvement this difference would be small). Consequently, an interaction between rounds and players was predicted. To test this, the scores for rounds one and five

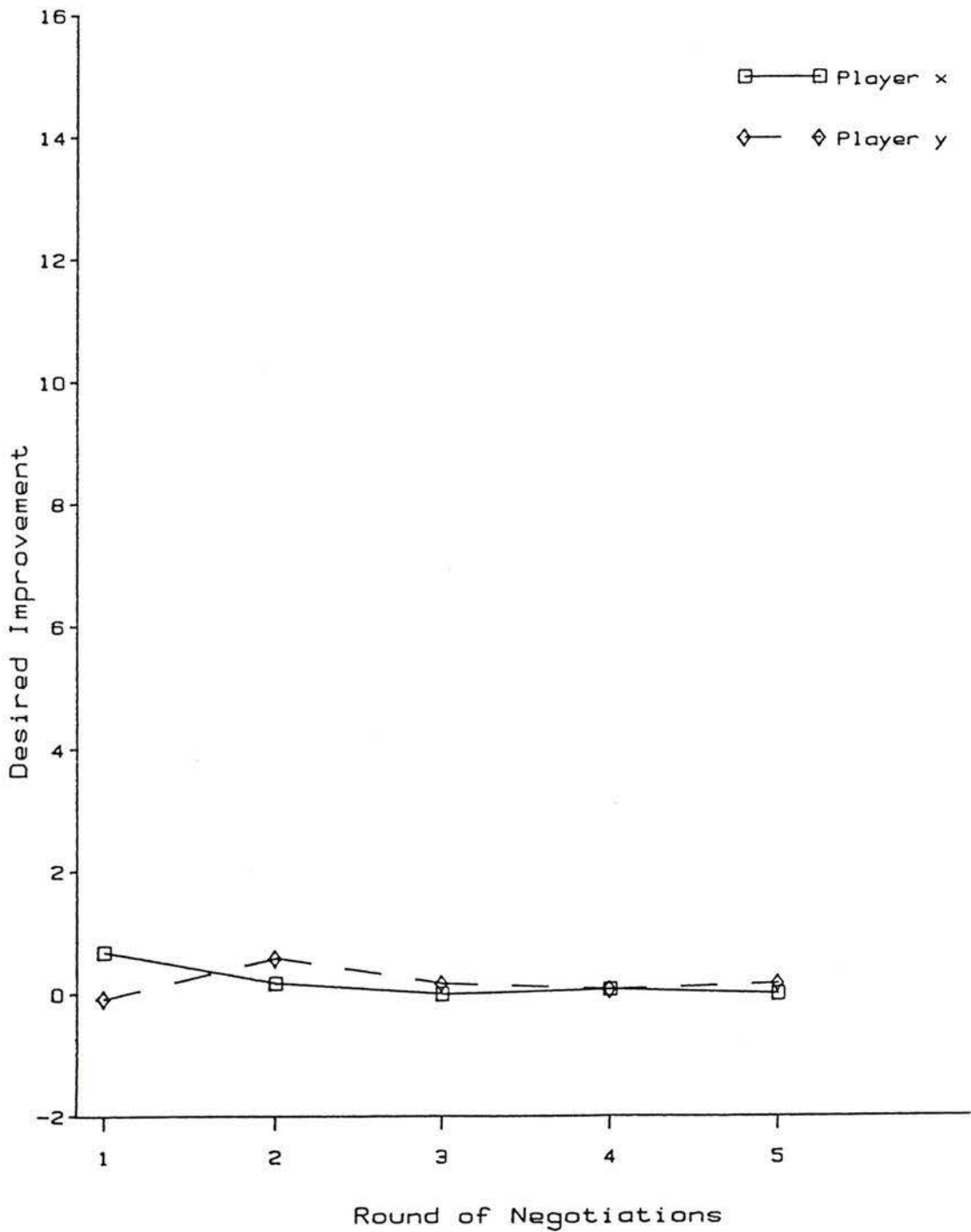


Average amount of improvement desired by each player (defined as the percent of Player x's resources that Player y's desired improvement represents where improvement is the predicted contribution or PC amount minus the amount the player wanted to contribute). Data are reported for the three resource conditions in Experiment 1 and the single condition in Experiment 2.

(presented in Figure 12 a-d) were compared for each condition (using a MANOVA with rounds and players as repeated measures). For the .50/.50 condition there were no differences between rounds or players as predicted. For the .75/.25 condition the main effects were both marginally significant (for rounds  $F(1, 11) = 5.31, p < .04$ ; for players  $F(1, 11) = 5.71, p < .04$ ) and there was an interaction between rounds and players ( $F(1, 11) = 11.97, p < .005$ ). Finally, in the .95/.05 condition there was a difference between rounds ( $F(1, 11) = 7.54, p < .02$ ) but no difference between the players. The latter finding is likely due to the variability in the x Players' scores (which for rounds one and five was 18.32 and 11.33, respectively). As predicted, the round by player interaction was significant ( $F(1, 11) = 8.59, p < .01$ ).

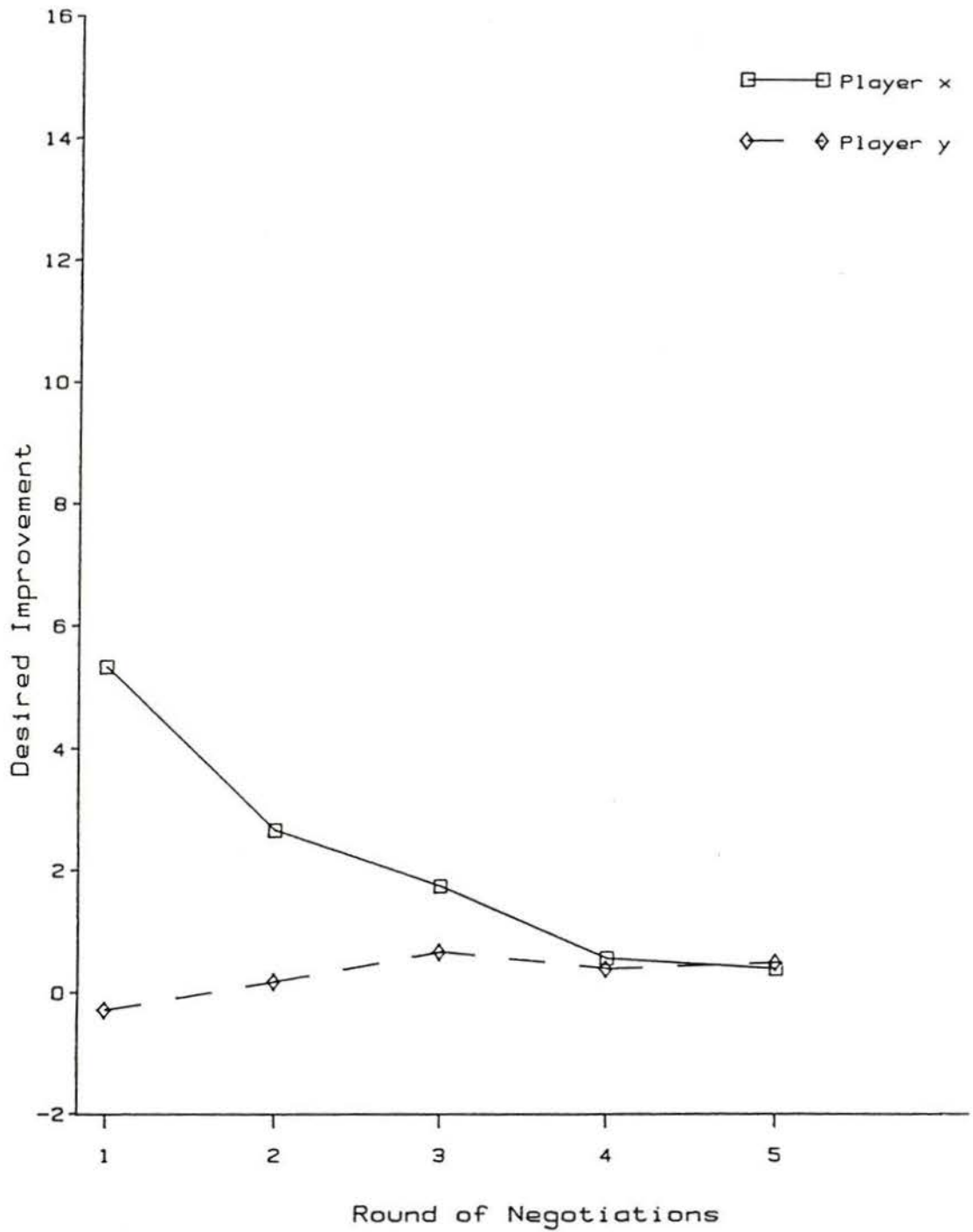
**Resource Scarcity -- Undercontributions.** Undercontributions were defined as the difference between a player's actual contribution and PC share of the DF (expressed as a percent of the player's own resources) [equation 15]. The model predicted that undercontributions would vary with resource scarcity with an interaction between players and conditions: when players' resource scarcity is equal (e.g., the .50/.50 condition) there will be no undercontributions, and as the discrepancy in resource scarcity increases (e.g., the .75/.25 and .95/.05 conditions), Player x (who has less resource scarcity) will overcontribute and Player y will undercontribute. As Figure 13 shows, the means followed this pattern. However, a MANOVA (with player as a within-subjects repeated factor) revealed that while Player y made larger

Figure 12a.



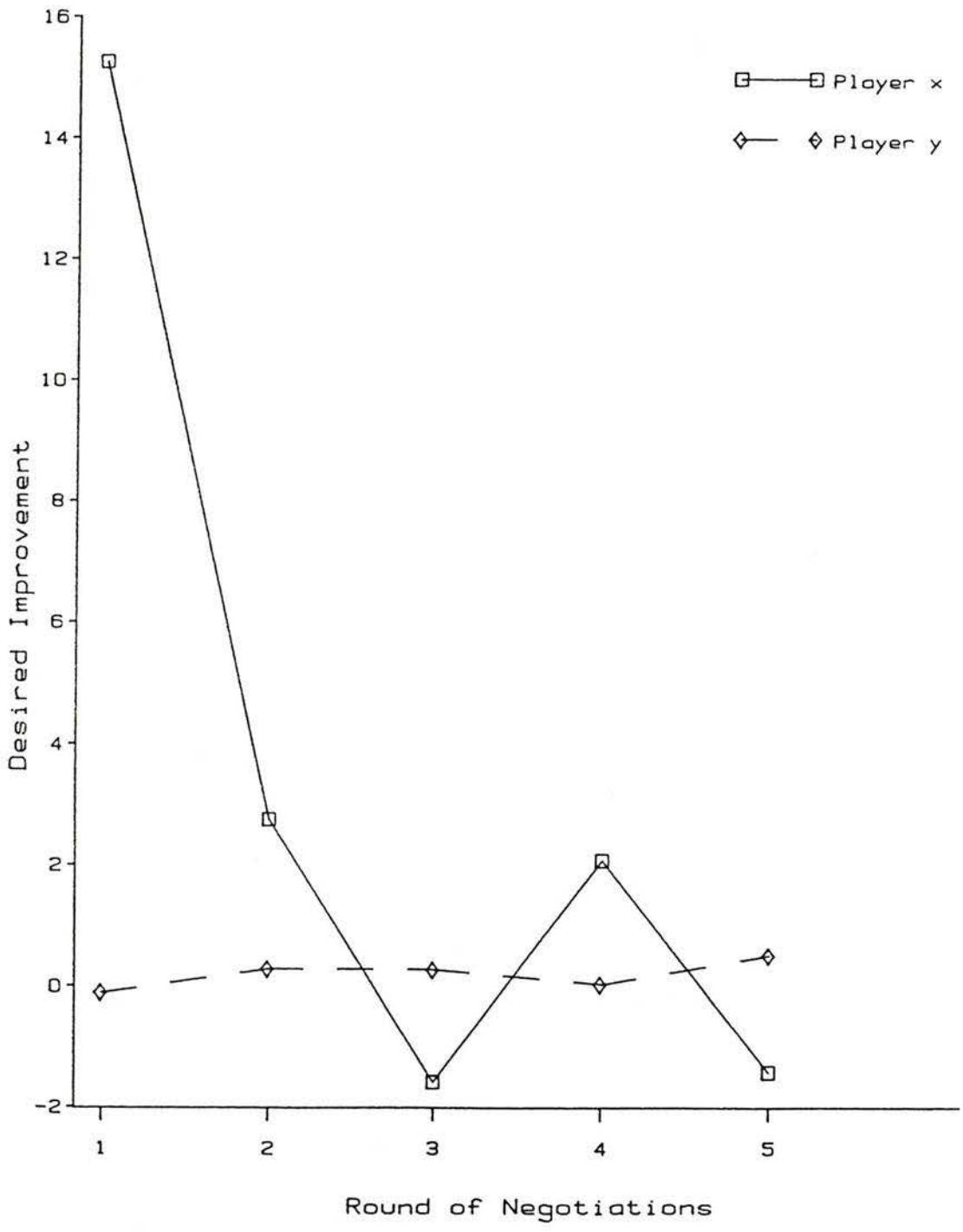
Desired improvement by round for players in the .50/.50 division of resources.

Figure 12b.



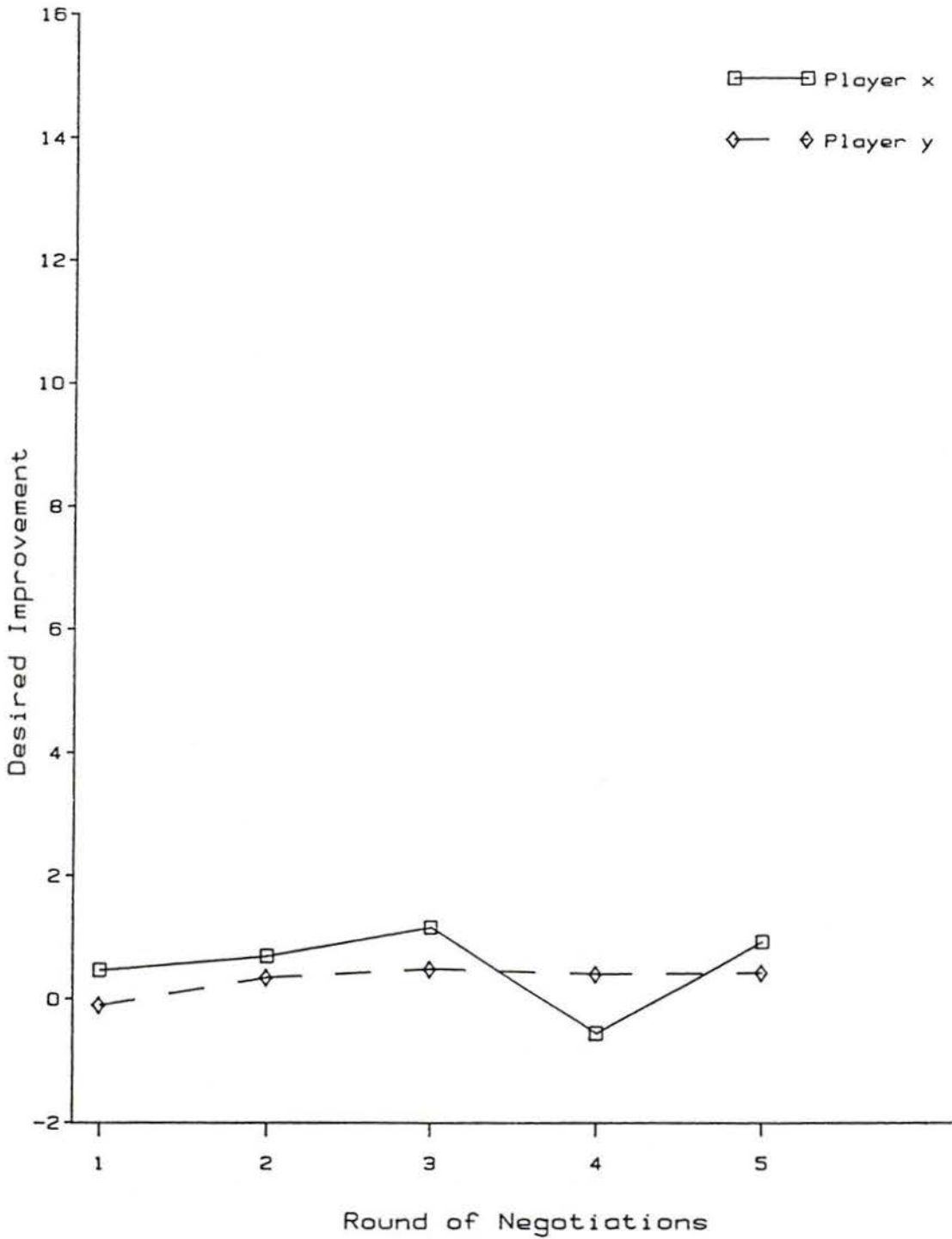
Desired improvement by round for players in the .75/.25 division of resources.

Figure 12c.

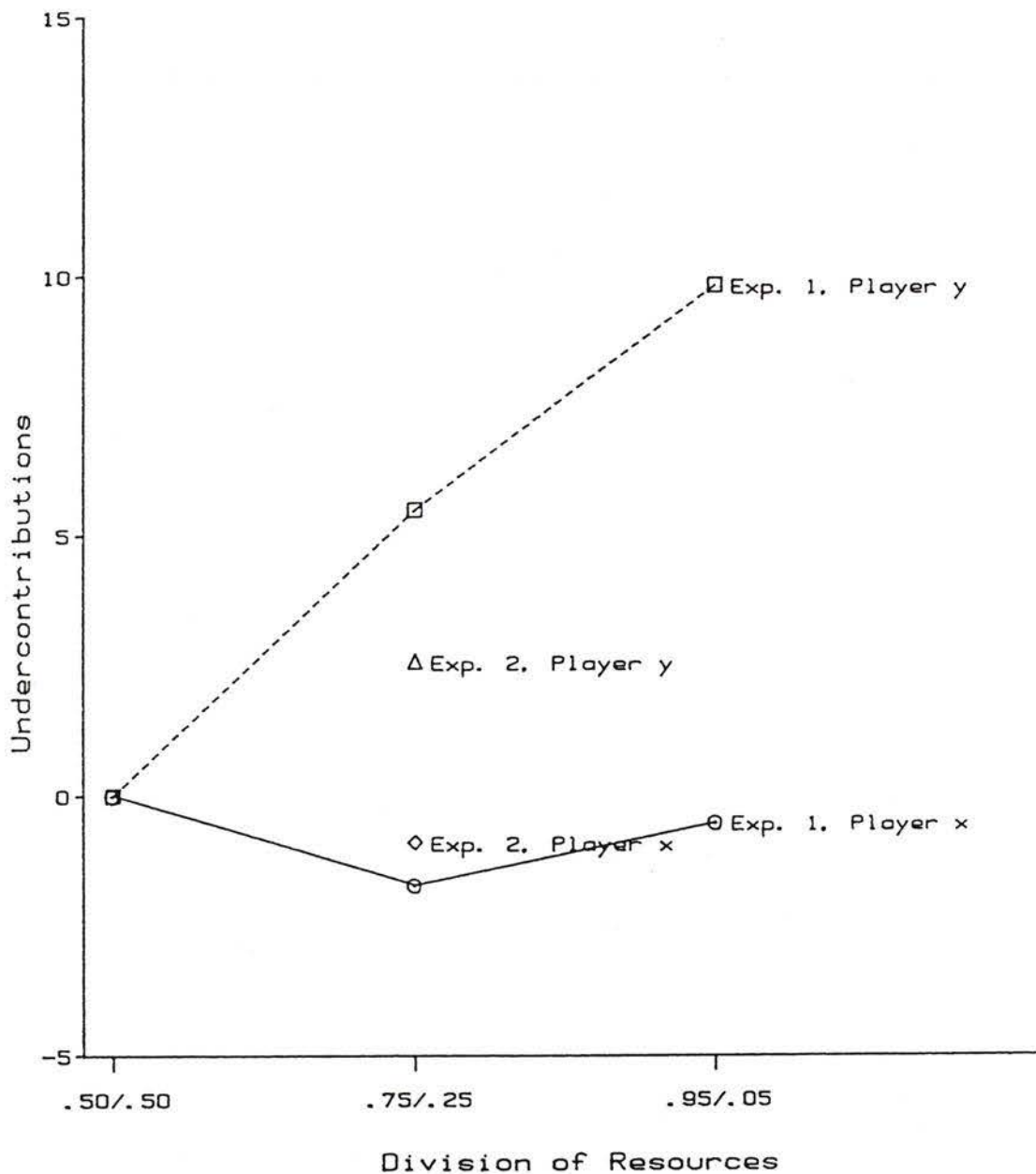


Desired improvement by round for players in the .95/.05 division of resources.

Figure 12d.



Desired improvement by round for players in Experiment 2.

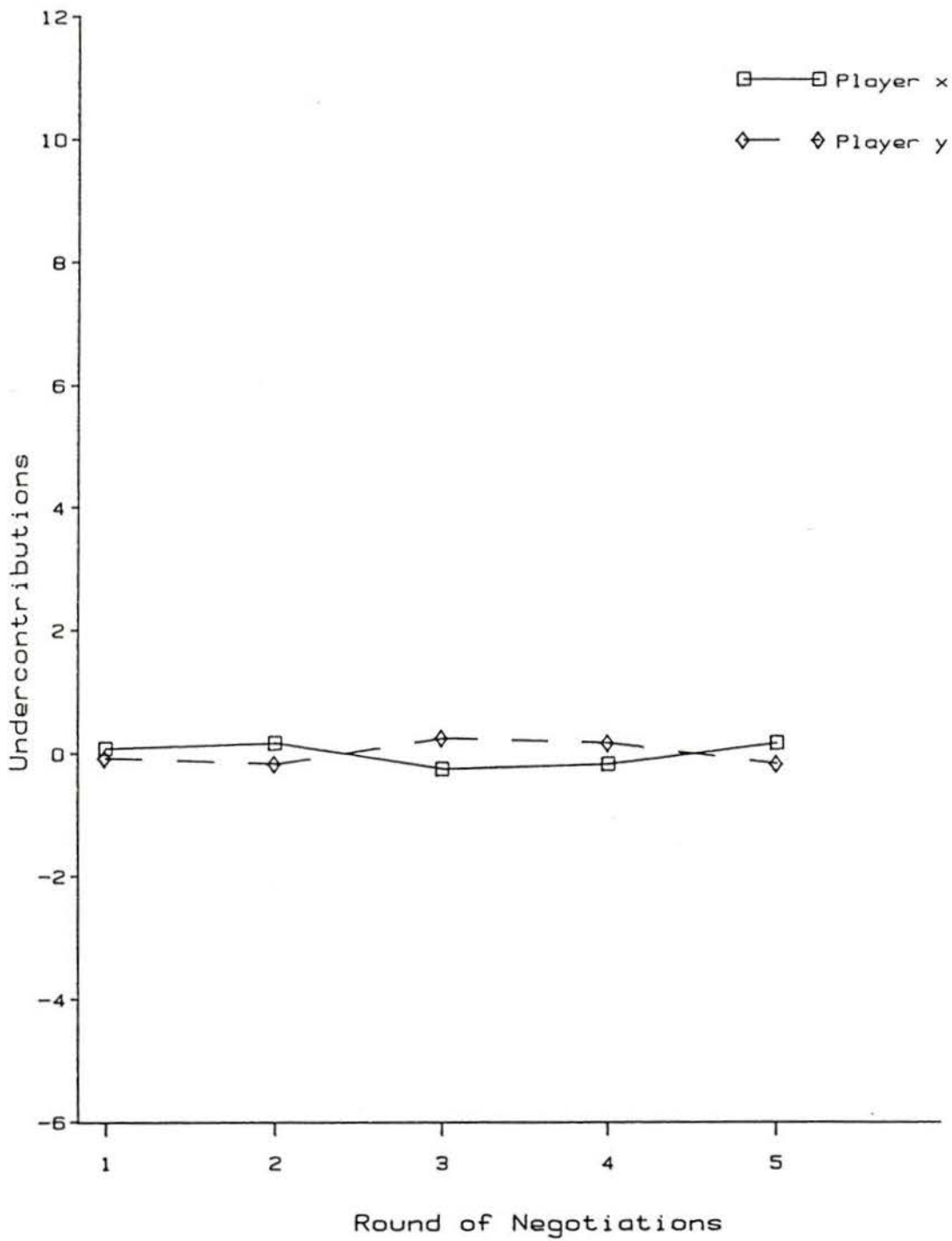


Average percent of their own resources that each player undercontributed (where undercontributions were defined as the difference between the amount a player actually contributed and the amount predicted by a PC strategy). Data are reported for the three resource conditions in Experiment 1 and the single condition in Experiment 2.

undercontributions ( $F(1, 33) = 8.61, p < .006$ ), there were no differences between the conditions and no interaction effect. The data for individual dyads revealed that 72% followed the predicted pattern: 83% in the .50/.50 condition, 75% in the .75/.25 condition, and 58% in the .95/.05 condition ( $p < .002$  by the binomial test).

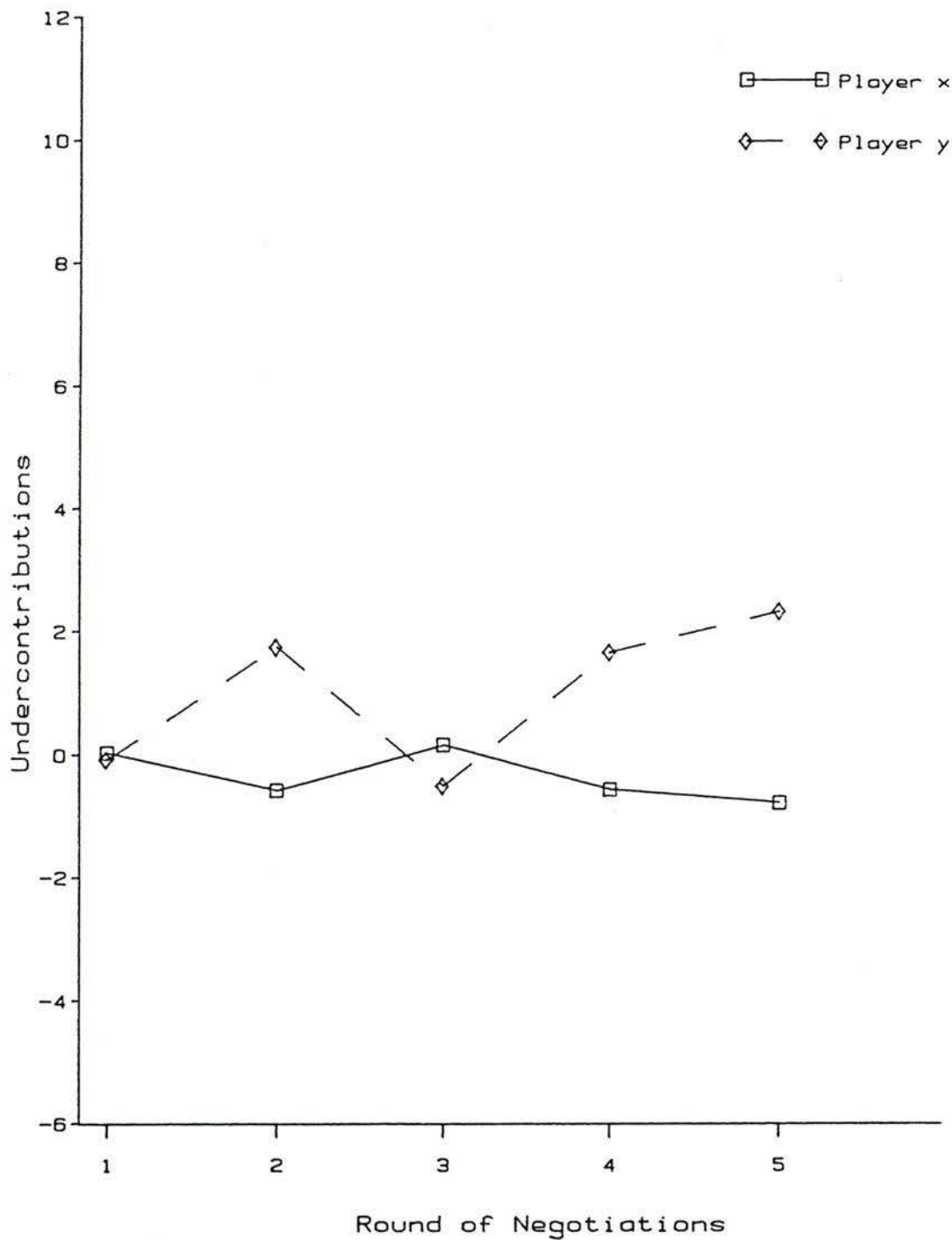
For each condition undercontributions by round (presented in Figure 14 a-d) were compared using a MANOVA (with scores on rounds one and five, and scores for Players x and y as repeated measures). As predicted, in the .50/.50 condition there were no differences between rounds or players and no interaction effect since the negotiators' resource scarcity was equal. For the .75/.25 and the .95/.05 conditions it was predicted that there would be an interaction between rounds and players (i.e., Player y's undercontributions would increase while Player x's decreased). For the .75/.25 condition the means followed this pattern but none of the differences were significant. For the .95/.05 condition the difference between players was not significant but the predicted interaction was found ( $F(1, 11) = 13.55, p < .004$ ) and the rounds differed ( $F(1, 11) = 13.55, p < .004$ ). This suggests that this interaction occurs only when there is a large resource scarcity discrepancy.

**Resource Scarcity -- Concessions.** The model predicted that when resource scarcity is equal (e.g., the .50/.50 condition) neither player will make concessions (concessions are defined as the difference between the proportion of the DF a player wanted to and actually contributed, taken as a percent of the other player's

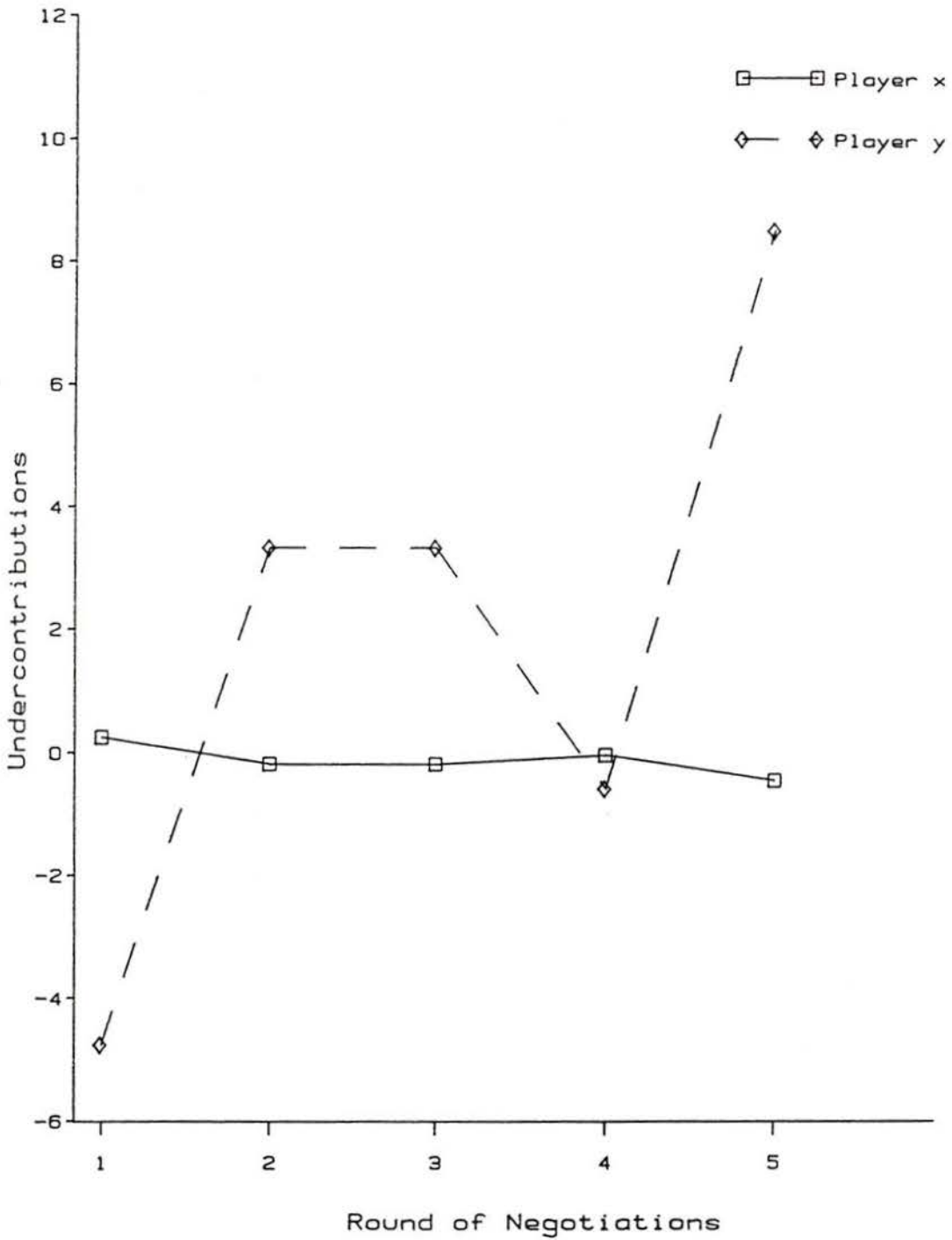


Undercontributions by round for players in the .50/.50 division of resources.

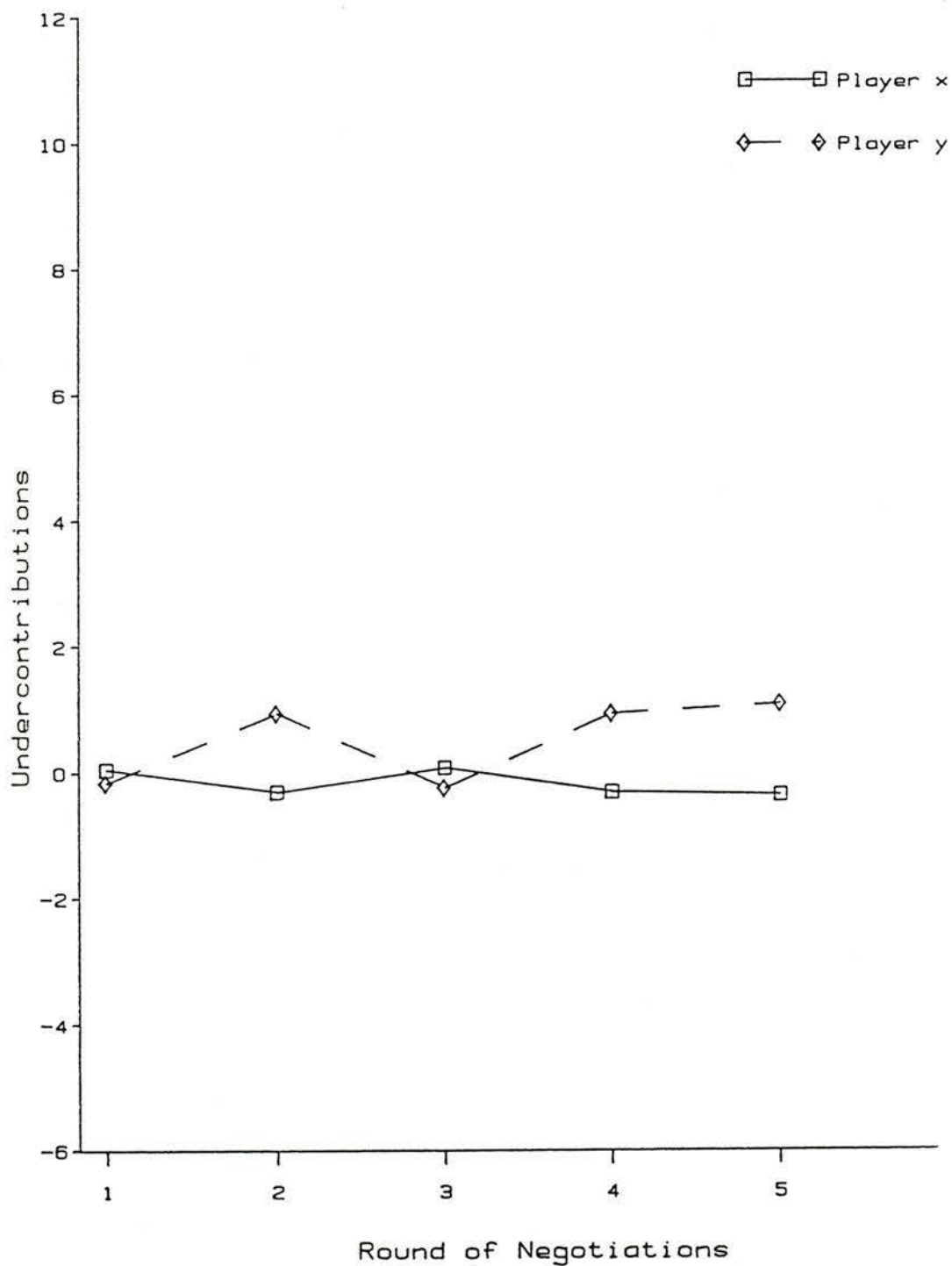
Figure 14b.



Undercontributions by round for players in the .75/.25 division of resources.



Undercontributions by round for players in the .95/.05 division of resources.



Undercontributions by round for players in Experiment 2.

resources) [equation 16]. When a difference in resource scarcity exists, only the larger party will make concessions (e.g., the x Players in the .75/.25 and .95/.05 conditions). These concessions will increase in size as the discrepancy in the players' resource scarcity increases. As Table 9 and Figure 15 demonstrate, the observed concessions followed this pattern.

In a MANOVA comparing the concessions of each player by condition (with player as a repeated, within-subjects factor), Player x made larger concessions than Player y ( $F(1, 33) = 17.80, p < .0001$ ), and these concessions varied by condition ( $F(2, 33) = 5.45, p < .009$ ). The predicted interaction between players and conditions was also found ( $F(2, 33) = 5.80, p < .007$ ). These results suggest that the impact of resource scarcity is more evident in concessions than undercontributions.

Considering x and y players separately revealed that the concessions of Player x differed by condition ( $F(2, 33) = 5.66, p < .008$ , accounting for 34% of the total variance). Specifically, their concessions increased as their proportion of resources increased (for the linear trend  $F(1, 33) = 11.29, p < .002$ ). Post hoc comparisons identified differences between the .50/.50 and the .95/.05 conditions. For the y Players the oneway ANOVA was not significant, as predicted.

The number of individual players making concessions in the conditions with a discrepancy in resource scarcity was also examined (using the average concessions for the five rounds). In the .75/.25 condition 100% of the x Players and only 50% of the y Players made

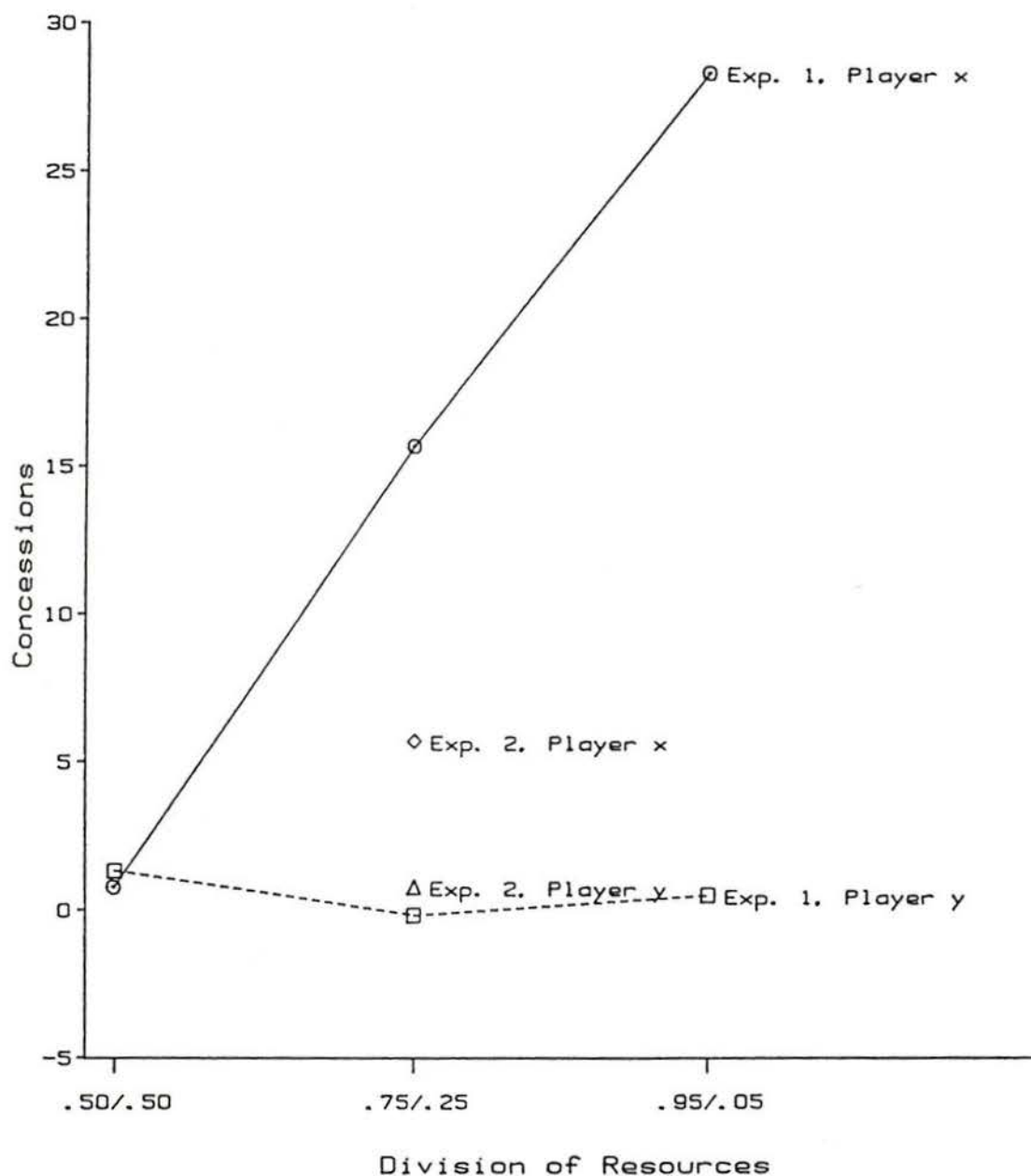
Table 9

## Concessions

Condition	Player	Average Concession	
.50/.50	x	0.80	(1.29)
	y	1.32	(1.51)
.75/.25	x	15.70	(5.22)
	y	-0.19	(2.55)
.95/.05	x	28.34	(34.35)
	y	0.49	(0.62)
Exp. 2	x	5.68	(5.35)
	y	0.76	(2.26)

Note. Concessions are defined as the difference between the proportion of the DF that a player wanted to and actually contributed expressed as a percentage of the other player's resources. All entries are means followed by standard deviations in brackets.

Figure 15.



Average concessions of each player (where the concessions of Player x were defined as the difference between the proportion of the DF that Player x wanted to and actually contributed expressed as a percentage of Player y's resources). Data are reported for the three resource conditions in Experiment 1 and the single condition in Experiment 2.

concessions. In the .95/.05 condition 83% of the advantaged players and 60% of the disadvantaged players made concessions. The number of  $x$  players following the pattern predicted for them was significant by the binomial test ( $p < .0001$ ).

As expected, in the .50/.50 condition where resource scarcity was equal, none of the dyads' written comments mentioned resource scarcity. In fact, one player wrote that he had "no way of arguing whether or not I should have to pay less or more depending on size". In contrast, 90% of the dyads bargaining with a resource discrepancy commented about resource scarcity. For example, a disadvantaged player (Player  $y$  in .75/.25) noted that: "if I can get away with putting in less...I will. As the poor country I probably can." It is interesting to note that comments about resource scarcity only appeared after two or more rounds had been played. Perhaps there is a time lag during which perceptions decrease in impact (i.e., the a priori notions linked to perceived power), and the effects of resource scarcity arising from actual bargaining increase.

To further assess the role of the discrepancy in resources, subjects rated its importance (from not at all to extremely important). The responses to this scale, reported in Table 6, show that it was rated as important. In the .50/.50 condition where there was no resource discrepancy, these responses may have represented the importance of keeping the discrepancy at zero. The conditions differed on this rating ( $F(2, 33) = 7.17, p < .003$ , accounting for 30% of the total variance) with higher scores reported by the large discrepancy conditions (for the linear trend  $F(1, 33) = 13.77, p$

<.001, accounting for 96% of the between-groups variance). Post hoc comparisons found significant differences between the .50/.50 and the .75/.25 conditions, and the .50/.50 and .95/.05 conditions.

### Discussion

The empirical evidence provided by Experiment 1 provides strong evidence for the model of intra-alliance negotiation behavior. Virtually all major predictions were supported including: (a) the conflict pattern varied in an inverted-U pattern with the division of resources, (b) the financial outcomes of the negotiations were as predicted with the smaller players receiving a better outcome (relative to their initial position) than the larger players, (c) subjective ratings of perceived power were found to be different than actual ability to influence the negotiations (effective power), (d) defense fund spending was as predicted, and (e) strategies based on fairness were used.

This study replicated the quadratic pattern of conflict reported by Vitz and Kite (1970) and A. Bavelas (personal communication, 1977). It found clearer evidence for the curvilinear conflict pattern than the Vitz and Kite study as it obtained significant results for subjective ratings of conflict over individual contributions where they had found a non-significant curvilinear pattern. This study also demonstrated the curvilinear pattern of conflict in two new measures -- observational ratings and the frequency of disagreement in preferred defense funds. The observational ratings were not as clear as the subjective conflict

measures.

This experiment also illustrated two forms of power -- perceived and effective power. As predicted, a priori subjective ratings of power expectations did not translate into actual ability to control the negotiations. The subjects with the most resources were rated as most powerful (by both members of the dyad) and they had the highest expectations of improvement in their relative financial position. However, these subjects actually made the largest concessions. In the negotiations it was the players with more resource scarcity (the poorer players) who received the best relative outcomes (in one condition these players actually gave less than their desired contribution amounts). This study also demonstrated that having and using effective power are different. Not all of the players with effective power tried to use it but when they did, they were generally able to bring about an improvement in their relative financial position.

The model also makes predictions based on the size of the DF. As the DF reflects both outcome goals (survival and payoff), it is difficult to clearly demonstrate each separate goal from it. If the players were only interested in survival, their DF would equal the maximum threat or, if their total resources were less than the maximum threat, it would be the maximum per round (or  $R/5$ ). A prediction for DF size that considers only payoff is not possible as payoff cannot be obtained without first surviving. The DF prediction that is the clearest statement of payoff is that if payoff is all important the DF will be the amount that generates the maximum

expected winnings. However, even this does not show payoff independently as the max  $E(W)$  takes into account the fact that subjects must first survive in order to receive payoff ( $E(W)$  is the product of the probability of surviving all rounds and the amount won). This problem notwithstanding, the model considers the difference between the DF needed for max  $E(W)$  and the empirical DF to illustrate the goals. Overall, the average DF was less than the maximum possible contribution but larger than the max  $E(W)$  level ( $t_{(35)} = 2.32$ ,  $p < .03$ ). The amount by which the subjects exceeded the max  $E(W)$  increased their probability of survival from .452 to .521 (an increase of .069) and decreased their expected winnings from 6.32 to 6.25 (a decrease of .07). This suggests that, while subjects place more emphasis on survival than payoff, both goals operate. As the difference in the survival independence of the negotiators increased, it was found that, as predicted, they tended to establish larger defense funds (i.e., DFs significantly above the max  $E(W)$ ). It seems that when there is more at stake there is a move toward more conservative solutions.

This study also illustrates the operation of two fairness standards -- equity and resource scarcity. Individual contribution strategies based on equity (a PC strategy) clearly dominated. Of the 10 subjects (14% of the sample) who deviated from this strategy, nine were in the .95/.05 condition. This suggests that when a large resource discrepancy exists and one player's resources are very limited, it may be more difficult for the players to see their strategies as strictly PC. Three possible explanations for this can

be derived. First, under these conditions the players often described their strategies as focused on final outcomes more than contributions per round. As the questionnaire item assessing strategies focused on contributions, it was inconsistent with these players' approaches and resulted in the selection of the "other" response category. Second, since small players had the same number of chips as rounds they occasionally calculated their contributions proportionately to the number of rounds. Third, in the same way that the disadvantaged players were limited by their resources, the wealthy players had an excess that sometimes resulted in a strategy that was roughly PC but not exactly. These players had so many chips that giving a few extra was of little consequence and, in recognition of this, they did not describe their strategy as PC.

The above areas found support for the model's predictions. In other, more minor areas some of the measures used did not produce the predicted results. For example, the measures of time and number of proposed solutions did not follow the conflict pattern identified in other conflict measures. All conditions were very similar in the number of proposed solutions indicating that conflict is not necessarily linked to the consideration of more alternative solutions. The measure of time revealed that many of the .95/.05 sessions were longer than either of the other two conditions. From general observations of the sessions it seems that this was due to the negotiators' lengthy attempts at deriving acceptable solutions in the face of their large discrepancy in resources. While these discussions were lengthy, they were not particularly conflict laden.

Often the negotiators in this condition spent time working out complex solutions that established agreements and trade-offs spanning several rounds. There was also more discussion of commitment (specifically, how Player y could show its commitment to the alliance if it did not contribute). Commitment was mentioned in the written comments of 40% of the dyads in this condition but did not appear in any other conditions. The length of the .95/.05 condition and the discussion of commitment may be due to the fact that the .05 players had the same number of chips as there were rounds. As the chips were indivisible these players were confronted with the decision to participate or not in each round. The only means by which they could obtain any financial payoff was to abstain from contributing in one or more rounds. All other players were able to maintain some level of contribution and still obtain payoff (i.e., they were able to give less than 1/5 of their resources in any round and still contribute).

Finally, while the predicted pattern of undercontributions was apparent in the pattern of means, the differences across conditions was not significant. Players with more resource scarcity did get significantly more improvement than their partners with less resource scarcity, but the changes in resource scarcity across the conditions did not result in changes in the amount of improvement and the predicted interaction was not demonstrated. It seems that players adhere more closely to their PC amounts than the model suggests.

## EXPERIMENT TWO

The main purpose of this study was to examine the prediction that conflict varies with the ratio of threat to resources. This prediction is one of the key departures the new model makes from previous crisis game models. Specifically, the model predicts that conflict varies not only with the division of resources between the negotiators (as demonstrated in Experiment 1) but also with the ratio of needed to available resources. In the previous experiment the resources of the alliance could not guarantee their survival (i.e., the alliance had 100 chips and the maximum total threat was 120). As the total resources change, the model predicts that conflict (and some other behaviors) will also change. Moderate resource discrepancies will still have more conflict than equal or large discrepancies, but the overall level of conflict will decrease as the total resources are increased or decreased.

In this experiment the total resources of the alliance were increased to 160 chips, giving the players more chips than the maximum threat. This meant that the players could potentially win more, and that they could guarantee their survival. It also changed their mutual dependence and their overall levels of perceived power and resource scarcity. This total resource amount was selected as it predicted a level of conflict that differed substantially from Experiment 1. By using the .75/.25 division of resources, this study employed the resource condition in which maximum conflict was found in the previous study. Changes in conflict levels and other behaviors between the studies can be used to examine the impact of a

different resource context.

## **Method**

### **Subjects**

Subjects were 16 male university students (8 dyads). In order to facilitate comparisons between this sample and Experiment 1, these subjects were selected in the same manner and with regard to the same criteria as the previous subjects. The subjects ranged in age from 18 to 29 years ( $\underline{M} = 22.06$ ,  $SD = 3.96$ ), and in educational level from 1 to 6 years ( $\underline{M} = 2.69$ ,  $SD = 1.96$ ). For the two experiments the difference in mean age was 0.10 years and the educational levels varied by 0.31 years. The subjects' payment was determined by the outcome of their negotiations and ranged from \$1.75 to \$12.50 ( $\underline{M} = \$7.11$ ). This increase in payment from Experiment 1 was due to the increase in the total available resources.

### **Procedure**

This study used the crisis game as described for Experiment 1 with three changes: (a) as the purpose of this study was to examine changes in negotiation behavior under a different resource context (i.e., a different ratio of threat to resources), the total resources were increased from 100 to 160, (b) only one division of resources was used (a .75/.25 division in which Player x was given 120 chips and Player y 40 chips), and (c) observations of conflict were made only by the experimenter. In Experiment 2 it was not necessary to lower the DF for any dyads in order to ensure that they participated in all five rounds of negotiations.

## Results

The results of Experiment 2 are reported using the same organization and technical conventions as described for Experiment 1. As was the case in Experiment 1, a MANOVA comparing Players x and y on the five rating scales was not significant, and accordingly, the analyses for these variables are based on the means for each dyad.

### Outcome Predictions

#### Conflict

**Subjective Ratings.** The model predicted that there would be less conflict [equation 17] in Experiment 2 than the comparable resource division condition in Experiment 1 (the .75/.25 condition). A MANOVA comparing these two conditions on the three ratings (see Figure 8) was significant (Pillais'  $F(3, 16) = 13.53$ ,  $p < .0001$ ) as were all univariate  $F$  tests at the .001 level (like Experiment 1, a MANOVA comparing Players x and y on the three conflict scales revealed no differences, and consequently, analyses were based on the means for each dyad). The model predicted that the conflict in Experiment 2 would be comparable to the .50/.50 condition in Experiment 1. A MANOVA comparing these conditions found no differences as predicted.

**Observations of Conflict.** Conflict was also measured using the observer ratings reported in Figure 9. The findings were as predicted [equation 17]: (a) a MANOVA comparing the .75/.25 condition and Experiment 2 for the three ratings found less conflict in Experiment 2 (Pillais'  $F(3, 14) = 10.81$ ,  $p < .001$  with all three

univariate  $F$ 's significant at the .001 level), and (b) a MANOVA comparing the .50/.50 condition and Experiment 2 found comparable levels of conflict.

**Other Conflict Measures.** Like Experiment 1, three other conflict measures were used: disagreement in desired DFs, number of proposed solutions, and time. Of these, only the first followed the conflict pattern (identified for the subjective ratings) with an average number of rounds in which the players' desired DFs differed ( $\underline{M} = 38\%$ ,  $SD = 16.69$ ) that was less than the .75/.25 condition in Experiment 1 ( $\underline{t} (18) = 6.56$ ,  $\underline{p} < .0001$ ) and comparable to the .50/.50 condition ( $\underline{t} (18) = 2.00$ ,  $\underline{p} < .06$ ). For the number of proposed solutions, Experiment 2 was not found to differ from Experiment 1 (in Experiment 1  $\underline{M} = 12$ , in Experiment 2  $\underline{M} = 11$ ). Finally, the average length of bargaining ( $\underline{M} = 580$  seconds,  $SD = 413$ ) did not differ from the .75/.25 condition in Experiment 1. In all of the data that has been collected, only the .95/.05 condition had significantly longer sessions.

#### **Effective Power/Final Ratio of Resources**

As Table 4 shows, in this experiment the final ratio of resources [equation 20] and the proportion of money won by each player were similar to the level predicted by the ratio of the players' effective power [equation 21]. Five dyads (62%) moved in the predicted direction producing a final ratio that was less discrepant than the initial ratio. As predicted, the amount the subjects deviated from their initial ratio was small in this low conflict condition.

### Defense Fund Spending

Like Experiment 1, the DFs established by all dyads were above the expected threat (which for both studies was 70) -- the average DF in Experiment 2 was 103 (SD = 8.07) with the lowest DF set at 93. This DF also exceeded the amount needed to produce the max E(W) (which in Experiment 2 was 95) ( $t(7) = 2.75$ ,  $p < .03$ ) and supported the prediction that as the average survival independence [equation 2] of the players increased the amount by which the DF exceeded the max E(W) increased (as Table 5 shows, in Experiment 2 the average survival independence of the two players is larger than any of the Experiment 1 conditions as is the difference between the DF and the max E(W) level).

### Process Predictions

#### Goals of the Negotiators

As the model predicted, the importance of the goals was unaffected by the change in the ratio of threat to resources. As Table 6 shows, the ratings by subjects in the two experiments are similar and, like Experiment 1, the majority of subjects (81%) rated survival as more important than payoff ( $p < .01$  by the binomial test).

#### Perceived Power

The division of resources in Experiment 2 was comparable to the .75/.25 in Experiment 1 and thus measures of relative perceived power (i.e., Player x's relative to Player y's) were predicted to be the same for both studies [equation 10]. A comparison of the means reported in Figure 10 supported this prediction ( $t(18) = 0.75$ ,  $p < .46$ ). Like Experiment 1, the average empirical perceived power

deviated from the predicted value ( $\underline{t}(7) = 2.41, p < .05$ ).

Unfortunately, an absolute measure of perceived power (i.e., of each player separately) was not obtained and consequently changes in the overall level of perceived power predicted by the ratio of threat to resources could not be tested.

### Fairness

The model predicted that fairness ratings would not vary with the ratio of threat to resources. In line with this, there were no differences between the overall mean ratings in Experiments 1 and 2. In this study 50% of the dyads mentioned fairness in the written descriptions of their individual contribution approaches, and only 38% placed it below the midpoint of the rating scale (see Table 6).

As in Experiment 1, all dyads reached agreement in all rounds. As one of the wealthy players noted in his explanation of his individual contribution amount: "Cooperation ensures survival and thus this continued support ensures little bickering and mutual support".

Equity -- Individual Contribution Strategies. As predicted, the results in Table 7 show that a PC contribution strategy [described by equation 12] dominated: (a) for the multiple choice questionnaire 94% selected the PC alternative, and (b) in the written comments all dyads described a PC strategy. Examples of these written comments included: "I contribute proportionally as much as Country B so that in the final analysis we are both equal", and "I have 3 times as much as he does, I should contribute 3 times as much".

Desired Improvement. As Table 8 shows, in both studies all players (on average) wanted to improve their financial position. Data for individual players revealed that 75% wanted to give less than their PC amount while only 19% wanted to give more and 6% wanted to give their exact PC share ( $p < .02$  by the binomial test). According to the model [equation 13], the large resource holder (Player x) will desire more improvement than the other alliance member (Player y). While the means fell in the predicted direction (see Figure 11), the difference between the players was not significant.

Experiment 2 has a different ratio of threat to resources and, as a result, the model predicted that the desired improvement of x Players would be lower than the .75/.25 condition in Experiment 1. While the data in Table 8 show that the means followed this pattern, the difference between them was not significant. For the disadvantaged players there was no difference in their desired improvement in Experiment 2 and the .75/.25 condition of Experiment 1 as predicted.

Due to the influence of resource scarcity, it was predicted that desired improvement would vary across the five rounds of negotiations. As there was less resource scarcity in Experiment 2, the model predicted that there would be less desired improvement (i.e., the players would adhere more closely to their PC amounts), and less deviation in desired improvement scores across rounds (with no differences between players or rounds). Using the data presented in Figure 12d, a MANOVA (with rounds and players as repeated

measures) supported the prediction by revealing no significant differences.

**Resource Scarcity -- Undercontributions.** The model predicted that undercontributions would vary with the division of resources and the ratio of threat to resources [equation 15]. The amount by which the players deviated from their PC share revealed that Player x overcontributed (mean undercontribution = -1%, SD = 3.92) and Player y undercontributed ( $\bar{M} = 3\%$ , SD = 11.74) although this difference was not significant. The means fell in the predicted pattern (see Figure 13) and 62% of the dyads were in line with the prediction. The second aspect of this prediction (the ratio of threat to resources) predicted that there would be smaller deviations from the PC amounts in Experiment 2 than the .75/.25 condition in Experiment 1. As the Experiment 1 amounts did not deviate (they showed close adherence to the PC amounts), the finding that the Experiment 2 amounts did not differ from them was not surprising.

As there was a discrepancy in the resource scarcity of the players in Experiment 2 it followed that the pattern of undercontributions by round would be similar to the conditions in Experiment 1 with discrepancies in resource scarcity (the .75/.25 and the .95/.05 conditions). As Figure 14 (b, c, and d) demonstrate, the patterns of means for these conditions were comparable (i.e., the amount for Player x decreased while the amount for Player y increased) but, as predicted, since there was less resource scarcity the amounts in this experiment were lower than the .75/.25 condition in Experiment 1 (although the difference between them was not

significant).

**Resource Scarcity -- Concessions.** When there are discrepancies in resource scarcity the model predicted that the larger player would make concessions while the smaller player would not [equation 16]. The concessions in Experiment 2 supported this (see Table 9) and the difference between the players was significant ( $t(14) = 2.40, p < .03$ ).

It was predicted that the concessions of the wealthy players in Experiment 2 would be smaller than the wealthy players in the .75/.25 condition in Experiment 1 (since there was less overall resource scarcity and the discrepancy in the resource scarcity of the players was smaller in Experiment 2). The pattern of means (in Figure 15) was as predicted with fewer concessions made by player x in Experiment 2 ( $t(18) = 4.17, p < .001$ ). The concessions of the y players in these two studies did not differ, as predicted.

Like Experiment 1, the importance of the discrepancy in the resources of the members of a dyad was also measured (see Table 6). The average rating was well above the midpoint of the scale and did not differ from the .75/.25 condition in Experiment 1.

### Discussion

Experiment 2 offers additional experimental support for the model and makes three key contributions: (a) it supports the conflict predictions unique to the proposed model, (b) it verifies some Experiment 1 findings, and (c) it tests several predictions for behaviors and outcomes that, like conflict, differ with changes in

the ratio of threat to resources.

The conflict findings are the most notable contribution of this study. By changing the economic context of the negotiations (i.e., reducing the ratio of threat to resources), the moderate resource discrepancy condition that had the most conflict in Experiment 1 (a .75/.25 division of resources) became comparable to the low conflict conditions. Conflict was not simply a result of differences in the division of resources as Vitz and Kite (1970) and A. Bavelas (personal communication, 1977) predicted.

Some predictions generated by the model identify patterns that do not change with the ratio of threat to resources. In this experiment no changes were observed for the subjective ratings of the importance of the outcome goals and the importance of fairness, the DF remained above the expected threat, all players obtained payoff, the relative ratings of perceived power reflected the ratio of resources, all players cooperated, a PC strategy was used to guide individual contributions, players desired financial improvement, the resource discrepancy was rated as important, and more large than small players made concessions. The support found for these predictions offers further empirical verification of the model.

In Experiment 2 there were several areas that, like the conflict predictions, identified factors that change with changes in the ratio of threat to resources. For example, the experiments differed in the average survival independence of the players and, in line with this, Experiment 2 found a DF that was significantly above the maximum expected winnings amount whereas Experiment 1 (in the comparable

.75/.25 condition) did not. The rank order of the DFs for the three Experiment 1 conditions and the Experiment 2 condition were as predicted ( $p < .04$ ). Likewise, the final ratio of resources (which is linked to effective power) predicted different outcomes for these studies. For both, the observed ratios and the amount of winnings were as predicted (for the rank orders  $p < .04$ ), and in both there was a link between conflict and the ratio of resources (in high conflict situations the winnings of Player x deviate from the PC amount to a greater extent than in low conflict situations).

There were two areas in which the findings are more ambiguous -- undercontributions and desired improvement. The data on undercontributions is somewhat difficult to assess for several reasons. First, the model predicts that there will be a difference between the players but, given the small size of the predicted effect, and the small sample size, this was not observed (although the pattern of means was in the predicted direction). Second, the Experiment 1 data on undercontributions did not follow the predicted pattern and consequently comparisons between the two experiments were limited.

For desired improvement the data in Experiment 2 was also inconclusive. Specifically, while the means for this study relative to the .75/.25 condition in Experiment 1 were in the predicted direction, the difference between the studies was not significant. Again, this could be due to the size of the predicted effect and the fact that a small sample was used. Desired improvement is linked to perceived power. The difference between the two studies on perceived

power is small (in Experiment 1 the total perceived power for the two players was .4117 and for Experiment 2 it was .3044 -- this represents a difference of only .1073). The total resource amount for Experiment 2 was selected to demonstrate changes in conflict. Conflict is a function both of average mutual dependence and differences in resource scarcity, and its predicted levels are quite different for the two studies. However, the difference in perceived power on its own was not large enough to unequivocally test the predictions generated by it.

## CHAPTER FOUR

### General Discussion

A model has been developed that explains negotiation behavior in alliances and predicts, among other things, the pattern of conflict that will occur. The cornerstone of this model is the assumption that these mixed-motive negotiations are governed by two outcome goals -- survival and financial payoff. By examining how the outcome goals influence the strategies, positions, power, and fairness standards of negotiators (using the example of NATO negotiations in the crisis game), a multifaceted model was developed and then was tested in two experiments. This model, and its empirical evidence, makes several contributions to the literature on intra-alliance negotiations in particular, and negotiations in general.

First, this model demonstrates the application of a mathematical modelling approach. The use of mathematical models is by no means new. The contribution of this model is that it illustrates how an existing, complex situation can be analyzed mathematically. Rather than starting from the premise of modelling a single variable or combination of pre-determined factors, this model took a more wholistic orientation and was developed by considering an example of intra-alliance negotiations on economic matters (the crisis game) in totality. As a result, this model looks at many variables and their interactions rather than at a single variable (such as perceived power, fairness, etc.) in isolation. In so doing it develops assumptions that consider many commonly referred to aspects of

negotiations and it shows how they are intimately related. While the model is still limited (e.g., it applies just to alliances negotiating joint economic decisions), it is more detailed than many models.

This model also clearly illustrates the application of mathematical equations to variables that are ambiguous (e.g., fairness). In this model variables such as the perceived fair contribution of a negotiator, perceived power, need or resource scarcity, etc. are translated into specific, numerical predictions of behavior. From this, new predictions were generated in many areas (including conflict predictions that counter an existing theory).

The second contribution of this model is that it clarifies concepts important to intra-alliance negotiations. The model advances several ideas and concepts that are counter-intuitive. For example, power is an issue that is frequently raised with regard to negotiations but is often misunderstood. In this model power is not just directly related to resources although the formulation of both forms of power incorporate the wealth of each party. Effective power is linked to how much a negotiator has as well as the player's levels of resource scarcity and dependence. Perceived power is likewise derived from resources, but it also considers the relationship between the amount available and the demand for it. The result is that perceived power shows an overall decrease as total resources decrease relative to what is needed (in this case, what is needed to meet the threat). Another interesting concept in this model is that perceived power does not translate into actual or effective power --

negotiators who are seen as having the most power were found (as predicted) to be less able to get what they actually want. The exercise of power interacts with other aspects of the negotiations such as the value of fairness and the interdependence of the negotiators.

Another area in which a prediction of this model may be seen to be counter-intuitive is the curvilinear conflict pattern and the changes in this pattern under different total resource conditions. The nature of the relationship of the threat to the total resources of the alliance and the division of those resources among its members suggests patterns of conflict that would not be readily apparent outside the context of the model.

Third, an important contribution of this model is its advancement of theoretical understanding of intra-alliance negotiation behavior. It counters the theories proposed by Vitz and Kite (1970), Lee (1986), and Bavelas (personal communication, 1977), as well as some of the concepts in Equity Theory, Bargaining Theory, and the Equal Excess Model.

Vitz and Kite (1970) proposed a model that mathematically predicted the correct conflict pattern for one particular total resource condition, but they were unable to support the assumptions used to generate this prediction. The model developed here draws on new concepts and leads to many more predictions than the Vitz and Kite model, as well as to a prediction about the pattern of conflict contrary to their model. The new model predicts Vitz and Kite's and Bavelas' data as demonstrated in the replication of their approaches

in Experiment 1. However, the data obtained in Experiment 2 shows that their models are limited and are unable to predict conflict when the total resources change relative to the threat. The new model captures this element and generates many other predictions that describe aspects of intra-alliance negotiation behavior that were not addressed in the previous models.

Equity Theory uses a single standard of fairness that is related only to outcomes. In contrast, the model presented here (like Distributive Justice Theory) uses multiple fairness standards. While it links these standards to the equity of outcomes, it considers more than Equity Theory does by addressing the way in which the equity standard relates to expectations as well as outcomes. In this regard, this new model suggests that all negotiators want to improve their position and hence that they desire a move toward greater inequity (Equity Theory does not recognize this). While the negotiator's desired outcomes differ from Equity Theory, their actual behavior is in line with it with outcomes that are in fact more equitable than the initial ratio of resources. By examining the importance of the outcome goals, and the predictions which follow from these goals (through intervening variables describing the economic and power positions of the negotiators and the value of fairness), this model predicted patterns of outcomes for both the DF size and the final ratio of resources that were close to those observed empirically. Defense fund spending was observed to vary with the average survival independence of the negotiators as the average DFs increased as the players' survival independence

increased. The amount that each individual party spends on this fund (and hence their final ratio of resources) is determined by their resource scarcity (or need) and their level of mutual dependence. Negotiators with more resource scarcity and those with more dependency received better financial outcomes (relative to their fellow alliance member) and consequently can be said to have had more effective power. In these experiments both negotiators wanted to improve their financial position but it was the small resource holder who was best able to influence the negotiations to achieve this. In line with the model, these outcomes differed from the negotiators' a priori expectations of who would control or influence the negotiations and showed that perceived and effective power are not the same.

This model also counters a pertinent assumption in two theories of coalition bargaining -- Bargaining Theory and the Equal Excess Model (as extended by Komorita (1979)) -- as well as a similar assumption in Lee's (1986) model of intra-alliance negotiations. All of these asserted that the economically advantaged negotiator would favor a strategy based on an equal sharing of costs, whereas the disadvantaged negotiator would desire a proportional strategy (Komorita & Nagao, 1983). In contrast, this model suggests that, following from the equity standard of fairness, all negotiators will adopt the same strategy (a PC approach). The equal cost standard was not predicted as (a) it cannot be accomplished in large discrepancy conditions (i.e., when one player has a small resource base the dyad cannot establish an adequate DF using the equal cost fairness

standard), and (b) it has been associated with groups focused on social relations rather than economic productivity (i.e., financial payoff) or welfare (i.e., survival) of the group members (Deutsch, 1975). The model's prediction of a PC strategy was supported in the empirical studies. These studies demonstrated that fairness is seen to be important and that the dominant strategy used as a guideline for individual contribution amounts reflects the equity standard. They also showed that actual contributions deviate from a strict equity definition to give an advantage to the party with the most resource scarcity.

Finally, this model extends and applies Distributive Justice Theory in several ways: (a) it explores the need (or resource scarcity) standard of fairness (to date, a large portion of the literature has looked at the equity and equality standards with need given less theoretical and empirical attention), (b) it applies concepts from Distributive Justice Theory to a specific type of group (alliances), (c) by considering alliances with differing levels of resources it addresses a largely neglected area, namely the analysis of power or positions in the context of justice or fairness issues, and (d) it furthers the conceptualization of fairness in negotiations by employing multiple standards of fairness (rather than looking at how a single standard operates, this model identifies two standards and examines the application of both in the same situation).

Given these envisioned areas of theoretical development, as well as the other contributions of this model and the strong empirical support it has received, it is anticipated that it will provide a

valuable extension of our understanding of conflict, fairness, power, strategies, expectations, outcomes, and inter-dependencies in intra-alliance negotiations.

### **Future Research Directions**

This model of intra-alliance negotiation behavior identifies many factors and generates a range of predictions. While the studies reported here provided tests of many aspects of the model, its level of complexity suggests that additional research beyond the scope of a dissertation will be needed to more fully evaluate it. This research falls into three categories: (a) research suggested by the two experiments to clarify their findings, (b) research to explore the model (as it is presented here) more fully, and (c) research to expand or extend the model into new areas and test its generalizability.

### **Research Suggested By The Experiments**

While the majority of the model's predictions were supported in the experiments reported here (with the major predictions confirmed), in some minor areas the results were ambiguous. These suggest avenues for further investigation.

For example, methodological issues were raised regarding the measure of perceived power that make it difficult to know whether the model, or the measurement approach, or both need refinement. Another area was the attempt to measure conflict in more objective ways (i.e., time and the number of proposed solutions). More attention should be directed toward finding conflict measures that do not rely

so heavily on subjective and observational ratings. Further investigation is also needed using a broader range of resource divisions between the negotiators. In particular, the extreme discrepancy condition needs to consider situations in which the smaller player's resources do not equal the number of rounds. Another question for further research concerns the extent to which the subjects saw themselves as participants in a voluntary relationship. As the model assumes that a voluntary relationship exists between the negotiators it would be advantageous to assess this and possibly to emphasize this feature in the instructions given to the subjects. Finally, in the second experiment a level of resources was selected that did not produce a large change in some of the variables from Experiment 1. Given the small sample size these small changes were not readily identified. Research using more subjects and different ratios of threat to resources is needed both to clarify the patterns of change, and extend the empirical data beyond the conditions that were investigated.

### Exploration of the Model

The main area in which further exploration is indicated concerns specific elements in the model. The research in these two experiments examined predictions derived from the model rather than manipulations and tests of its specific elements. Future research should assess individual elements such as the way in which interdependence, resource scarcity, etc. impact negotiation behavior. For example, resource scarcity can be studied by using a confederate negotiator (as was done by Michener and Cohen (1975)). In this

manner specific proposed solutions and the rationales supporting them (based on resource scarcity) can be offered and responses, such as concession making, can be measured. Individual elements in the mathematical equations should also be further investigated. For example, it is possible to develop several equations for factors like the contextual representation of the ratio of the threat to resources (while  $E(T)/(E(T) + R)$  was selected there are other possible expressions). Additional research is needed to explore the implications of such factors.

Second, the exact shape of the conflict pattern predicted by the model has not yet been fully investigated. Experiment 1 described a curvilinear conflict pattern. However, as only three resource distributions were used the exact shape of the conflict curve was not determined.

Third, it was suggested that the ongoing context of intra-alliance negotiations may be an important aspect of their cooperative nature. While the experiments employed here used multiple rounds of negotiations, they were limited to a single session lasting approximately 50 minutes. This issue needs to be explored through the use of negotiations over a longer time span.

Fourth, if additional rounds of negotiations are used it may also be possible to explore the way in which strategies evolve and change over time (e.g., changes in risk-taking behavior and perceptions of the threat could be investigated). While the current study's use of five rounds did allow for analyses of changes across rounds, it may be possible to more reliably detect changes across

time if more rounds are used.

All of the above points illustrate additional ways in which the model may be tested. As the model contains many factors and generates a large number of predictions it is necessary to evaluate it in many ways. Since the model progressively builds on its concepts, one evaluation approach is to substitute empirical data from earlier concepts into later predictions. For example, the perceived power and resource scarcity equations [10 and 14] consider the same parameters and consequently, it is possible to replace the theoretical predictions of resource scarcity with empirical perceived power values. As a result, data pertaining to differences in perceptions of power can be substituted into equations using differences in resource scarcity. Differences in resource scarcity is a factor involved in predictions of conflict [equation 17] and thus it is possible to identify two predictions of conflict: (a) the theoretical predictions generated by equation 17, and (b) predictions of conflict generated by substituting differences in perceived power into equation 17. The differences between these predictions (using the data from the experiments reported here) are very small and both predict an inverted-U curvilinear pattern. For example, the theoretical levels of conflict (presented in Figure 7) for Experiment 1 (where total resources were 100 and the maximum threat for five rounds of negotiations was 120) were .0000, .1628, and .0455 for the .50/.50, .75/.25, and .95/.05 conditions, respectively. For the same conditions the predicted values using the difference in perceived power substitution were -.0027, .1456, and .0317. A similar

substitution was made for differences in resource scarcity in both the final ratio and effective power equations [20 and 21]. Again, the substituted values were very similar to the theoretical values with virtually no difference in the predicted values for the .50/.50 condition. The largest differences were obtained for the .95/.05 condition with the final ratio predictions differing by 1.75 (the theoretical prediction was a ratio of 9.73:1.00 and the substitution prediction was 11.48:1.00). Although these values differed, both predicted a final ratio that was less discrepant than the initial ratio (with the theoretical prediction closer to the values observed in the experiments). The basis for the difference between these values is clearly seen in Figure 10. The largest deviation of the observed ratings of perceived power from the theoretical predictions occurred in the .95/.05 condition and consequently, using these ratings as theoretical substitutions produced a discrepancy in the predictions. As noted above, the measures of perceived power may have been influenced by a methodological problem and consequently, further research using new perceived power scales may produce data that modifies these substituted predictions.

This demonstration of the substitution of empirical values for theoretical values points out the value of this approach for testing the model's assumptions concerning the inter-relatedness of various factors (i.e., if the substitutions are able to predict the findings then additional support is given to the use of those factors in the theoretical equations). This approach also identifies an avenue for future research. The data obtained in the two experiments reported

here did not allow for substitutions for several factors in the model. For example, the conflict equation [17] incorporates two factors: differences in resource scarcity and average mutual dependence. It would be possible to have subjects rate their perceptions of dependence and independence for the goals of survival and payoff. While dependence and independence were defined objectively in the model (e.g., survival independence is based on the probability of survival), it is likely that perceptions of these factors are a monotonic function of objective dependence (i.e., as the players are made aware of the nature of the threat it is likely that their perceptions of dependence will correspond to objective dependence). Consequently, subjective ratings could serve as substitutions for the theoretical values (along with the above differences in resource scarcity substitution) to more fully test the conflict equation.

### Extensions of the Model

The model needs to be extended in several ways. The crisis game used well-defined negotiations with several limited parameters (as previously identified). Extensions of these parameters can be used to expand the model. For example, the model assumed that resources had been defined and were monolithic. The exploration of ambiguous resource bases may more closely approximate actual negotiations (e.g., NATO negotiations often involve a trade-off between different forms of contributions such as personnel as compared to arms). The model also assumed that the negotiations were monolithic and hence did not consider issues such as the impact of observers or the need

for ratification on the negotiations. Finally, the model was developed to explain intra-alliance negotiations by two parties. Its extension beyond single-party dyads or dyads composed of several parties per side has yet to be explored. Such extensions will have to consider many issues including coalition formation, changes in the degree of cooperation, and differences in how power is used (Dwyer, 1984).

Another research area is the investigation of other categories in Eccles' (1983) framework (which divided organizational negotiations into internal and external orientations and economic and ideological focuses). Issues to be considered include the extent to which the model has applications for external and/or ideological negotiations and cross category impacts (e.g., the way in which external factors impact internal negotiations and the relationship between ideological and resource issues). The extension of the model to non-alliance negotiations may also be a fruitful research direction.

The model focused on several aspects of intra-alliance negotiations. It did not, however, consider any individual difference variables such as personality, age, threat perception, etc. The extent to which this model applies to given individuals should be explored.

Finally, the model offered some initial considerations of how the rounds of negotiations differ. Future work should extend this level of analysis. For example, relationships between DF spending and the size of the threat could be studied, as could changes in

desired improvement and concessions over more rounds of negotiations.

### Summary

These research directions point to ways in which the model can be more fully evaluated. Although the two experiments reported here tested many of the model's predictions, its complex nature and the range of predictions generated by it should give rise to research designed to further explore, extend, and refine the model.

**Footnote**

1. In Experiment 1 the threat was lowered for 14 dyads who otherwise would have been overthrown given the size of their DF. The five such cases in each of the .50/.50 and .75/.25 conditions and the four cases in the .95/.05 condition were excluded and the statistical tests reported were re-calculated (to produce equal cells, an additional dyad was randomly removed from the .95/.05 condition). This re-analysis was conducted to determine if the data from these dyads had changed the findings in any substantial manner. The results were very similar to those reported for Experiment 1. The most notable difference was for the observer ratings of conflict. The significant differences between conditions revealed in a MANOVA for the three observations was non-significant in the re-analysis. However, the means for the three scales were very similar (the largest difference between the re-analysis and Experiment 1 data was 2.85 on a 100 point scale). This suggests that the non-significant finding was probably due to the small sample size in the re-analysis (as observational data was not collected for two dyads in each condition, the re-analysis was based on only six dyads per condition). Other differences included: (a) the differences between conditions in time was non-significant, (b) post hoc comparisons for the measure of the number of proposed solutions revealed a clearer quadratic pattern as the .50/.50 and .95/.05 conditions did not differ, (c) the DF was slightly larger in the .50/.50 condition (by 4 chips) and consequently, in the re-analysis DF size did not change linearly with average survival independence, and (d) the final ratio

of resources was smaller in the .95/.05 condition (in Experiment 1 it was 8.34, in the re-analysis it was 6.00). The last two points (pertaining to DF size and ratio of resources) both follow logically from the fact that the players in the re-analysis established higher DFs (i.e., DFs above the threat). For all other measures the differences between Experiment 1 and the re-analysis scores were less than 6% with most measures differing by only 1 or 2 percentage points. The similarity between these two sets of data is not surprising given that the dyads with DFs below the threat still remained close to the threat (the largest deviation below the threat was only by two chips) and the average DF for these groups differed by only 1.78 chips (the mean DF in Experiment 1 was 88.17 and in the re-analysis was 89.95).

## References

- Bacharach, S. B., & Lawler, E. J. (1980). Power and politics in organizations. San Francisco: Jossey Bass.
- Bazerman, M. H., & Lewicki, R. J. (1985). Contemporary research directions in the study of negotiations in organizations: A selective overview. Journal of Occupational Behavior, 6, 1-17.
- Benton, A. A. (1971). Productivity, distributive justice, and bargaining among children. Journal of Personality and Social Psychology, 18, 68-78.
- Ben-Yoav, O., & Pruitt, D. G. (1984). Resistance to yielding and the expectation of cooperative future interaction in negotiation. Journal of Experimental Social Psychology, 20, 323-335.
- Cook, K. S., & Hegtvedt, K. A. (1986). Justice and power: An exchange analysis. In H. W. Bierhoff, R. L. Cohen, & J. Greenberg (Eds.), Justice in social relations, NY: Plenum Press.
- Deutsch, M. (1975). Equity, equality and need: What determines which value will be used as the basis for distributive justice? Journal of Social Issues, 31, 137-149.
- Deutsch, M. (1985). Distributive justice: A social-psychological perspective. New Haven, CT.: Yale University Press.
- Deutsch, M. & Krauss, R. M. (1960). The effect of threat upon interpersonal bargaining. Journal of Abnormal and Social Psychology, 61, 181-189.
- Deutsch, M., & Lewicki, R. J. (1970). "Locking-in" effects during a game of chicken. Journal of Conflict Resolution, 14, 367-378.
- Dwyer, F. R. (1984). Are two better than one? Bargaining behavior

- and outcomes in an asymmetrical power relationship. Journal of Consumer Research, 11, 680-693.
- Eccles, R. (1983). Negotiations in the organizational environment: A framework for discussion. In M. H. Bazerman & R. J. Lewicki (Eds.), Negotiating in organizations. Beverly Hill, CA: Sage.
- Emerson, R. M. (1962). Power dependence relations. American Sociological Review, 27, 31-41.
- Festinger, L. (1954). A theory of social comparison processes. Human Relations, 7, 117-140.
- Greenberg, J., & Cohen, R. (1982). Equity and justice in social behavior. N.Y.: Academic Press.
- Hancock, R. D., & Sorrentino, R. M. (1980). The effects of expected future interaction and prior group support on the conformity process. Journal of Experimental Social Psychology, 16, 261-269.
- Kipnis, D. (1976). The powerholders. Chicago: University of Chicago Press.
- Komorita, S. S. (1979). An equal excess model of coalition formation. Behavioral Science, 24, 369-381.
- Komorita, S. S., & Barnes, M. (1969). Effects of pressures to reach agreement in bargaining. Journal of Personality and Social Psychology, 13, 245-252.
- Komorita, S. S., & Nagao, D. (1983). The functions of resources in coalition bargaining. Journal of Personality and Social Psychology, 44, 95-106.
- Komorita, S. S., Sheposh, J. P., & Braver, S. L. (1968). Power, the use of power, and cooperative choice in a two-person game.

Journal of Personality and Social Psychology, 8, 134-142.

- Lamm, H., Kayser, E., & Schwinger, T. (1982). Justice norms and other determinants of allocation and negotiation behavior. In M. Irle & L. B. Katz (Eds.), Studies in decision making: Social psychological and socio-economic analyses. New York: Walter de Gruyter.
- Lee, D. K. (1986). A fairness model of conflict and negotiation within an alliance. University of Victoria: Unpublished paper.
- Lerner, M. J. (1980). The belief in a just world: A fundamental delusion. New York: Plenum Press.
- Leventhal, G. S. (1976). Fairness in social relationships. In J. W. Thibaut, J. T. Spence, & R. C. Carson (Eds.), Contemporary topics in social psychology. Morristown, NJ: General Learning Press.
- Leventhal, G. S. (1980). What should be done with equity theory? In K. Gergen, M. Greenberg, & R. Willis (Ed.), Social exchange: Advances in theory and research. N.Y.: Plenum.
- Locke, E. A. (1986). Generalizing from laboratory to field settings. Lexington, MA: Lexington Books.
- Marlowe, D., Gergen, K. J., & Doob, A. N. (1966). Opponent's personality, expectation of social interaction and interpersonal bargaining. Journal of Personality and Social Psychology, 3, 206-213.
- Marwell, G., & Schmitt, D. R. (1975). Cooperation: An experimental analysis. New York: Academic Press.
- Michener, H. A., & Cohen, E. D. (1973). Effects of punishment

magnitude in the bilateral threat situation: Evidence for the deterrence hypothesis. Journal of Personality and Social Psychology, 26, 427-438.

- Michener, H. A., Vaske, J. J., Schleifer, S. L., Plazewski, J. G., & Chapman, L. J. (1975). Factors affecting concession rate and threat usage in bilateral conflict. Sociometry, 38, 62-80.
- Mikula, G. (1980). On the role of justice in allocation decisions. In G. Mikula (Ed.), Justice and social interaction. NY: Springer-Verlag.
- Mitchell, T. R. (1985). Review and evaluation of research studies on negotiation behavior. Journal of Occupational Behavior, 6, 85-91.
- Morgan, W. R., & Sawyer, J. (1967). Bargaining, expectations, and the preference for equality over equity. Journal of Personality and Social Psychology, 6, 139-149.
- Morse, E. L. (1976). The bargaining structure of NATO: Multi-issue negotiations in an interdependent world. In I. W. Zartman (Ed.), The 50% solution. Garden City, NY: Anchor Books.
- Neale, M. A., & Northcraft, G. B. (1986). Experts, amateurs, and refrigerators: Comparing expert and amateur negotiators in a novel task. Organizational Behavior and Human Development, 38, 305-317.
- Olson, M., Jr., & Zeckhauser, R. (1966). An economic theory of alliances. Washington, D.C.: RAND Corporation.
- Pallak, M. S., & Heller, J. F. (1971). Interactive effects of commitment of future interaction and threat to attitudinal

- freedom. Journal of Personality and Social Psychology, 17, 325-331.
- Peterson, C. (1987). Need, equity, and equality in the adult family. Journal of Social Psychology, 127, 543-544.
- Pruitt, D. G. (1972). Methods for resolving differences of interest: A theoretical analysis. Journal of Social Issues, 28, 133-154.
- Pruitt, D. G. (1981). Negotiation behavior. NY: Academic Press.
- Pruitt, D. G., & Lewis, S. A. (1975). Development of integrative solutions in bilateral negotiation. Journal of Personality and Social Psychology, 31, 621-633.
- Putnam, L. L. & Jones, T. S. (1982). The role of communication in bargaining. Human Communication Research, 8, 262-280.
- Rubin, J. Z. (1983). Negotiation: An introduction to some issues and themes. American Behavioral Scientists, 27, 135-147.
- Rubin, J. Z., & Brown, D. R. (1975). The social psychology of bargaining and negotiations. New York: Academic Press.
- Sandler, T., & Cauley, J. (1975). On the economic theory of alliances. Journal of Conflict Resolution, 19, 330-348.
- Schelling, T. C. (1958). The strategy of conflict: Prospectus for a reorientation of game theory. Journal of Conflict Resolution, 2, 203-264.
- Schelling, T. C. (1960). The strategy of conflict. Cambridge, MA: Harvard University Press.
- Schulz, J. W., & Pruitt, D. G. (1978). The effects of mutual concern on joint welfare. Journal of Experimental Social Psychology,

14, 480-492.

- Schwinger, T. (1980). Just allocation or rewards: Decisions among three principles. In G. Mikula (Ed.), Justice and social interaction. NY: Springer-Verlag.
- Shaw, M. E. (1981). Group dynamics: The psychology of small group behavior. NY: McGraw-Hill.
- Smith, W. P., & Leginski, W. A. (1970). Magnitude and precision of punitive power in bargaining strategy. Journal of Experimental Social Psychology, 6, 57-76.
- Tedeschi, J. T., Bonoma, T., & Novinson, N. (1970). Behavior of a threatener: Retaliation vs. fixed opportunity costs. Journal of Conflict Resolution, 14, 69-76.
- Tedeschi, J. T., Lindskold, S., Horai, J., & Gahagan, J. P. (1969). Social power and the credibility of promises. Journal of Personality and Social Psychology, 13, 253-261.
- Thompson, L. L., Mannix, B. A., & Bazerman, M. H. (1988). Group negotiation: Effects of decision rule, agenda, and aspiration. Journal of Personality and Social Psychology, 54, 86-95.
- Tjosvold, D. (1988). Effects of shared responsibility and goal interdependence on controversy and decision making between departments. Journal of Social Psychology, 128, 7-18.
- Tjosvold, D., Johnson, D. W., & Johnson, R. (1984). Influence strategy, perspective-taking, and relationships between high- and low-power individuals in cooperative and competitive contexts. Journal of Psychology, 116, 187-202.
- Walster, E., Berscheid, E., & Walster, G. W. (1976). New directions

in equity research. In L. Berkowitz & E. Walster (Eds.), Equity theory: Toward a general theory of social interaction. NY: Academic Press.

Walster, E., Walster, G. W., & Berscheid, E. (1978). Equity: Theory and research. Boston: Allyn and Bacon.

Vitz, P. C., & Kite, W. R. (1970). Factors affecting conflict and negotiation within an alliance. Journal of Experimental Social Psychology, 6, 233-247.

Zartman, I. W. (1976). The 50% solution. Garden City, NY: Anchor Press.

Zartman, I. W. (1978). Negotiation as a joint decision-making process. In I. W. Zartman (Ed.), The negotiation process: Theories and applications. Beverly Hills, CA.: Sage.

Zartman, I. W., & Berman, M. R. (1982). The practical negotiator. New Haven: Yale University Press.

## Appendix A

### Verbal Instructions to Subjects

In today's session you will be negotiating as representatives of two countries in NATO. The purpose of these negotiations is for your alliance to establish a joint defense fund that will protect both of you against a threat from an unfriendly country. Your countries have different levels of wealth -- Country A is wealthier than Country B. Country A can spend up to \$X billion on the defense fund and Country B can spend up to \$Y billion (each poker chip is worth \$1 billion). Together, your two countries have a total of \$100 billion that can be spent on the defense fund.

You must negotiate two agreements: (1) how much you want to put into the alliance's defense fund in total by both parties, and (2) how much each country will individually contribute to this fund. Once you have made these decisions you will be exposed to the first threat. The threat will be represented by the total rolled by four dice. If your defense fund is less than this amount, your countries will be overthrown, you will lose all of your resources (that is, all of your chips), and the game will end. If your defense fund is equal to or greater than this amount you both survive and another round will be played.

For example, if you have a defense fund of 12 chips the dice will be rolled and you will either be overthrown or survive (1). Using four dice means that the threat can range from 4 to 24. The most likely number is 14 and the least likely numbers are 4 and 24

1. Two dice are rolled twice to demonstrate possible threats.

(that is, there are many combinations of numbers that add up to 14 but only one that equals four and one that equals 24) (2). The odds of a threat being high (e.g., 24) or low (e.g., 4) are equally likely and every time the dice are rolled the probabilities are the same -- the size of the threat on one round does not affect what the threat for the next round will be. When we play the game we will use the numbers obtained from rolls done in the past rather than actually rolling the dice each time. This is being done so that all subjects are faced with the same threats rather than letting different groups play the game with different sized threats.

You will play for five rounds (that is, you will negotiate the size of your defense fund and your individual contributions and be faced with a threat 5 times). If your alliance manages to survive all five rounds you will each be paid \$.25 for each chip your country has left at the end of the game. This payment is for the exclusive use of your country. If you are overthrown you lose all of your chips and the game ends. Whatever you spend on a round of play is spent -- anything in the fund that exceeds the threat level cannot be used in the next round of play (each round is played separately with no funds allocated for defense carried from one round to the next). If you evenly divide the total resources of your two countries over the five rounds it amounts to 20 chips per round (that is, your \$100 billion can be spent anyway you want. If you want to divide it evenly over the 5 rounds, 100 divided by 5 gives you 20 chips per round. But remember -- if you spend 20 chips on every round you will

---

2. This is demonstrated using the dice to show three ways of getting 14 and one way of getting 4 and 24.

have none left at the end of the game and you will not receive any payment).

Before each round and at the end of the game you will be asked several questions. Please answer these on your own without discussing them with the other player or letting the other player see your answers. These questions will help me understand how you negotiate. I will also be keeping notes on your negotiations and will be tape recording your discussions. The information you provide will be anonymous -- you will be identified only by a number. Is this okay with both of you?

So, to summarize, you will be negotiating as representatives of two countries, not as individuals. You will negotiate two decisions: (1) the size of your joint defense fund, and (2) how much each of you will contribute to it. Your defense fund must be equal to or greater than the threat in order to survive. The threat can range from 4 to 24 with 14 being the most probable number. You have a total of \$100 billion dollars -- Country A has \$X billion, Country B has \$Y billion. You will play for five rounds (or until your alliance is overthrown) and you will be paid \$.25 for each chip you have left at the end of the game. Your participation is completely voluntary and although I would appreciate your full participation in this study, you are free to leave at any time.

Any questions?

## Appendix B

## Preliminary Questionnaire

Player Number \_\_\_\_\_

1. Background Information: Age \_\_\_\_\_

Current year of university \_\_\_\_\_

2. Which of the following best describes how much control or influence you think each country will have in the negotiations?  
 Draw a straight vertical mark through the line at the point that best represents your response. For example,

Country B  
 will have  
 most  
 control

Country A  
 will have  
 most  
 control



**Appendix C**  
**Record of Negotiations**

Player Number \_\_\_\_\_

**INSTRUCTIONS:** Before each round you will be asked to make estimates that indicate what you want to have happen in that round. When you negotiate with the other player you are not bound by the numbers you write down -- they are only indications of what your country desires. What you actually do may be the same or different from these estimates. For each question please state the single amount (not a range of possible amounts) that you actually want (not your opening bargaining position, etc.). Answer only those questions that apply to the round you are about to play (do not go on to Round 2 questions until you have played Round 1).

**Round 1**

1. In Round 1 my country would like the defense fund to be \$ \_\_\_\_\_ billion.
2. In Round 1 I would like my country to contribute \_\_\_\_\_ billion dollars to the defense fund.
3. Briefly describe how you determined how much you want your country to contribute (i.e., how did you calculate the amount in question 2).

Round 2

1. In the last round we set the defense fund at \$ \_\_\_\_\_ billion.
2. My country contributed \_\_\_\_\_ billion dollars to this fund.
3. My country now has \_\_\_\_\_ billion dollars left.
4. In Round 2 my country would like the defense fund to be \$ \_\_\_\_\_ billion.
5. In Round 2 I would like my country to contribute \$ \_\_\_\_\_ billion.
6. Briefly describe how you determined how much you want your country to contribute in this round (i.e., how did you calculate the amount in question 5).

Round 3

1. In the last round we set the defense fund at \$ \_\_\_\_\_ billion.
2. My country contributed \_\_\_\_\_ billion dollars to this fund.
3. My country now has \_\_\_\_\_ billion dollars left.
4. In Round 3 my country would like the defense fund to be \$ \_\_\_\_\_ billion.
5. In Round 3 I would like my country to contribute \$ \_\_\_\_\_ billion.
6. Briefly describe how you determined how much you want your country to contribute in this round (i.e., how did you calculate the amount in question 5).

Round 4

1. In the last round we set the defense fund at \$ \_\_\_\_\_ billion.
2. My country contributed \_\_\_\_\_ billion dollars to this fund.
3. My country now has \_\_\_\_\_ billion dollars left.
4. In Round 4 my country would like the defense fund to be \$ \_\_\_\_\_ billion.
5. In Round 4 I would like my country to contribute \$ \_\_\_\_\_ billion.
6. Briefly describe how you determined how much you want your country to contribute in this round (i.e., how did you calculate the amount in question 5).

Round 5

1. In the last round we set the defense fund at \$ \_\_\_\_\_ billion.
2. My country contributed \_\_\_\_\_ billion dollars to this fund.
3. My country now has \_\_\_\_\_ billion dollars left.
4. In Round 5 my country would like the defense fund to be \$ \_\_\_\_\_ billion.
5. In Round 5 I would like my country to contribute \$ \_\_\_\_\_ billion.
6. Briefly describe how you determined how much you want your country to contribute in this round (i.e., how did you calculate the amount in question 5).

## Appendix D

## Final Questionnaire

Player Number \_\_\_\_\_

- 1a) At the beginning of the negotiations my country had \_\_\_\_\_ billion dollars.
- b) The other country started with \_\_\_\_\_ billion dollars.
- c) At the end of the negotiations, my country had \_\_\_\_\_ billion dollars.
- d) At the end of the negotiations, the other country had \_\_\_\_\_ billion dollars.

For questions 2 through 6 please draw a straight vertical mark through the line at the point that best represents your response. For example,

2. In general, when you negotiated how difficult was it for you to get the other country to agree with you?

Not at all  
Difficult

Extremely  
Difficult



3. How much disagreement was there between you and the other player over the size of the defense fund?

No  
Disagreement

Intense  
Disagreement



4. How much disagreement was there between you and the other player over the size of your individual contributions to the fund?

No  
Disagreement

Intense  
Disagreement



5. How important were each of the following goals to you when you negotiated?

a) the survival of my country

Not at all  
Important

Extremely  
Important



b) ensuring that my country was in a good financial position at the end of the negotiations

Not at all  
Important

Extremely  
Important



c) negotiating fairly; arriving at fair solutions

Not at all  
Important

Extremely  
Important



6. When you were negotiating, how important was the difference in the amount of resources each country had? (That is, to what extent were your decisions influenced by the relative size of each country's resources?)

Not at all  
Important

Extremely  
Important



7. Which of the following best describes the main strategy you used to calculate the amount each country should contribute to the defense fund?

\_\_\_\_\_ a. The cost of the defense fund was split in half (e.g., if we agreed to a \$12 billion defense fund each of us gave \$6 billion).

\_\_\_\_\_ b. Each country contributed the same proportion or percentage of his resource (e.g., if one country had two times as many chips as the other country he contributed twice as much).

\_\_\_\_\_ c. Other. Please describe the main strategy you used:

## Vita

Surname: SCHMIDT Given Names: FAYE NELLA

Place of Birth: EDMONTON Date of Birth: 07/18/57

### Educational Institutions Attended

Concordia College, Edmonton, Alberta	1975 to 1977
University of Alberta, Edmonton	1977 to 1981
University of Victoria, British Columbia	1985 to 1988

### Degrees Awarded

Bachelor of Arts (Special)	1979	University of Alberta
Master of Education	1981	University of Alberta

### Awards

Province of Alberta, Queen Elizabeth Scholarship  
1976/77 and 1977/78

Board of Governors Scholarship (Concordia College) 1977

Province of Alberta, Graduate Scholarship 1980/81

University of Victoria, Graduate Fellowship 1985/86

Province of British Columbia, Post-Secondary Scholarship  
1985/86 and 1986/87

Social Sciences and Humanities Research Council of  
Canada Doctoral Fellowship 1986/87, 1987/88, and 1988/89

American Psychological Association Dissertation Research  
Award 1988

North Atlantic Treaty Organization Research Fellowship 1988/89

Lorne Kendall Award (Canadian Psychological Association) 1988

University of Victoria, President's Research Scholarship 1988

### Publications

- Schmidt, F. N. (1979). Review of the Employment Search Program. Canadian Counsellor, 13, 223-224.
- Schmidt, F. N., Carney, P., & Fitzsimmons, G. (1986). An empirical assessment of the migraine personality type. Journal of Psychosomatic Research, 30, 189-197.
- Schmidt, F. N. & Gifford, R. (in press). A dispositional approach to hazard perception: Preliminary development of the Environmental Appraisal Inventory. Journal of Environmental Psychology.

## Partial Copyright License

I hereby grant the right to lend my dissertation (the title of which is shown below) to users of the University of Victoria Library, and to make single copies only for such users or in response to a request from the Library of any other university, or similar institution, on its behalf or for one of its users. I further agree that permission for extensive copying of this dissertation for scholarly purposes may be granted by me or a member of the University designated by me. It is understood that copying or publication of this dissertation for financial gain shall not be allowed without my written permission.

Title of Dissertation: A MODEL OF MIXED-MOTIVE INTRA-ALLIANCE  
NEGOTIATION BEHAVIOR

Author:

A solid black rectangular box redacting the author's signature.

Signature

FAYE NELLA SCHMIDT

---

Name

December 8, 1988

---

Date