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TITLE OF THESIS/TITRE DE LA THÈSE A Quantitative Analysis of Interstate Behaviour

UNIVERSITY/UNIVERSITÉ Carleton University

DEGREE FOR WHICH THESIS WAS PRESENTED/
GRADE POUR LEQUEL CETTE THÈSE FUT PRÉSENTÉE M.A.

YEAR THIS DEGREE CONFERRED/ANNÉE D'OBTENTION DE CE DEGRÉ 1976

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A QUANTITATIVE ANALYSIS
OF INTERSTATE BEHAVIOUR

by

F. J. Deeg BAsC.

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A thesis submitted to the Faculty of
Graduate Studies and Research in partial
fulfilment of the requirements for the degree of
Master of Arts
in International Affairs

The Norman Paterson School of International Affairs

Carleton University

Ottawa, Ontario

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April 1976

The undersigned hereby recommend to the Faculty of
Graduate Studies and Research acceptance of this thesis, submitted
by Frank J. Deeg, in partial fulfillment of the requirements for
the degree of Master of Arts.

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ABSTRACT

This thesis examines the determinants of the behaviour of one nation-state directed toward another. Links between dyadic attributes and the level and nature of directed dyadic behaviour are analyzed, based on the assumption that any particular pair of nation-states possess properties of a relational nature. Given that nation-states utilize various means to pursue their ends, similarity is a dyadic property defined as the equivalence in the amount of means available to the two nations in a dyad, while homogeneity is defined as the equivalence between two nations in the manner in which each allocates its available means.

Borrowing from studies by Wright, Rummel, Rosenau, Galtung, and McClelland, it is hypothesized that the degree of similarity within a dyad will account for the level of directed dyadic behaviour. Furthermore, it is hypothesized that increasing degrees of dyadic homogeneity are accompanied by more peaceful and co-operative directed dyadic behaviour. After the operationalization and testing of these two hypotheses, the results are supportive of the first, although qualified, and indeterminate for the second.

ACKNOWLEDGEMENT

The data utilized in this thesis were made available in part by the Inter-university Consortium for Political Research. The data were originally collected by R.J. Rummell in conjunction with the Dimensionality of Nations project. Neither the original source or collectors of the data nor the Consortium bear any responsibility for the analyses or interpretations presented here.

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CHAPTER I

Introduction

Since the close of the Second World War, both the relations between nations and the discipline devoted to their study have undergone dramatic changes. Nevertheless, anarchy, to a certain extent, remains the operating environment for both. In a manner similar to nations learning from past experience, so too has the field of international relations gradually evolved into more than merely an amalgam of disparate disciplines vying for supremacy in an intellectual jungle.¹ Where, during the past three decades, international relations have undergone a shift from conjecture to more reasoned behaviour², likewise the scholastic endeavour to describe, explain, and predict interstate behaviour has moved to a point "beyond conjecture"³. These changes, of course, have not come about painlessly or cheaply. Just as the world has, on several occasions in the recent past, been on the brink of nuclear annihilation, so too has the discipline had brushes with academic extinction.

For the study of international relations, these "close calls" were the result of a period of almost fanatic obsession with numbers and concomitant "fishing expeditions", and an on-going debate between the traditional and quantitative schools of thought.⁴ In its recovery, the dis-

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cipline has emerged more intellectually sound than ever, and it would now appear that most scholars view the previous debate as a non-issue. For any academic pursuit to be successful, a careful blend of conservative wisdom and radical thought, of creative hunches and dogged rigour, of theoretical insights and empirical testing is essential. The vigorous growth of the discipline is evidence that international relations scholars have realized this.⁵

It is the goal of this particular study to probe into the complexities of interstate behaviour in order to discover discernible patterns in both the nature of and reasons for such behaviour. Although this study builds on the constructs and results of previous work, the reader need scarcely be reminded to expect no "scientific laws" nor even theoretical breakthroughs. By developing and testing some hypotheses having their roots in the existing literature of interstate behaviour, the analyst hopes merely to add "evidence to insight".⁶ Specifically, the analysis will focus on the directed behaviour of nation-pairs (actor-target) as the dependent variable, and certain properties of the nation-pairs (dyads) as independent or predictor variables of that behaviour.

The desire to describe, explain, and predict the external or foreign policy behaviour of nation-states has long been a primary concern of international relations studies. In general, such studies have focused on two

major aspects of such behaviour, war and integration, which, intuitively, appear to lie at opposite extremes of a continuum that could be labelled as affective behaviour. Since the behaviour between and among nations is not governed by distinct and enforceable policies or norms⁷, it seems appropriate to restrict attention to the type of behaviour described by the "affective" continuum. However, it should be noted at the outset that conflictual and peaceful behaviour are not necessarily mutually exclusive. Integrative forces within a region may inspire conflict⁸. Moreover, conflict may be creative in alleviating tensions and dissolving outstanding frustrations⁹. Russett has commented on this:

...., it must be clear that violent conflict is not simply the opposite of integration, nor its avoidance sufficient evidence that two states are highly integrated...., conflict may be suppressed by the operation of a relationship where one party dominates the other. Or conflict may be avoided merely because the actions of the nations in question are not relevant or salient to each other (they have nothing to fight about), or by an elaborate process of deterrence, without implying that the parties in question manifest any great ability to respond to each other's needs or to work out solutions to joint problems.¹⁰

In addition to the problem of determining the exact nature of the war-integration continuum, there is another and perhaps more fundamental issue. As the discipline attracted more adherents, so also the proliferation of

definitions of these types of behaviour expanded. For studies concerning both war and integration, there seem to be almost as many definitions of these two concepts as there are scholars studying them.¹¹ Attempts to accumulate knowledge on the causes of these phenomena would appear to be frustrating exercises, indeed, since, if basic definitions of the dependent variable differ, the knowledge seems unlikely to be cumulative in any meaningful sense.

In endeavours to tackle these problems more rigorously and with greater consistency, as well as to facilitate attempts at comparative international research, a broader focus on behaviour emerged. As recently stated in a leading journal.

It ... became apparant that acquisition of verifiable knowledge about the determinants and consequences of national external behaviour was contingent upon a prior ability to measure foreign policy behaviour in a typology or set of dimensions and categories for the description and classification of that behaviour.¹²

Following in this tradition, this study will attempt to extract several dimensions of externally directed nation-state behaviour, and try to explain them. The scope of the study, however, will be limited to the be-

haviour of directed dyads, rather than that of a particular nation-state toward all external targets.

In the existing literature on interstate behaviour, there are both theoretical and empirical justifications for this approach. Firstly, there is an obvious assumption that if one wishes to understand the behaviour of one nation to another, one should focus on the behaviour expressed by the former to the latter. Thus, as a "first cut" at analysis, it would seem intuitively reasonable to focus on specifically target-directed behaviour rather than more general outwardly-directed behaviour. This is not to suggest that all international behaviour is conducted in dyadic contexts however. Much of the literature on alliances, U.N. voting patterns, etc., is concerned with multilateral behaviour. Nevertheless, the underlying theoretical focus of many scholars has been the dyad.¹³ It is within the dyad that one can more easily isolate patterns of behaviour, as well as the determinants and consequences of that behaviour. In addition, one study, at least, has demonstrated that the types of behaviour between two nations differ from the types of behaviour exhibited monadically.¹⁴

Having isolated the dependent variable of directed dyadic behaviour of nation-states, it is necessary to turn

to a brief examination of the choice of independent variable. It would appear that there are basically three avenues open to evaluation: monadic attributes and/or behaviour, dyadic attributes and/or behaviour, or systemic attributes and/or behaviour. Immediately, for reasons of logical consistency, the dyadic concept seems most appropriate. Following from Singer¹⁵, using the dyadic level of analysis would provide richer descriptive power than the systemic level, although with less depth than the national level. Moreover, while not as restrictive as the systemic over-emphasis on the uniformity among nations, the dyadic level allows for greater simplicity regarding teleological and phenomenological aspects of the determinants of behaviour than does the monadic level. As a result, the dyadic level of analysis can provide elementary, yet effective, explanatory power. If the focus of the study were monadic external behaviour, one would be concerned with domestic sources of foreign policy behaviour such as public opinion, decision-making processes, or other various models.¹⁶ Similarly, if systemic patterns of behaviour were of prime concern, one would direct attention to environmental or global influences upon such behaviour, such as a resource-scarce environment, the presence or absence of international organizations such as alliances, or the U.N., or other aggregated aspects of international society.¹⁷ Furthermore, both national and systemic determinants of

international behaviour may have cross-cutting influences, and require the explication of complex causal chains, involving reciprocity and feedback, for analysis. Needless to say, both these effects may also be at work in an analysis of dyadic behaviour. However, by focusing on dyadic determinants of dyadic behaviour, the analyst can begin to assess the salience of dyadic influences compared to other possible determinants, as well as satisfy the requirements of theoretical rigour.¹⁸

Given the emphasis on dyadic determinants, it becomes necessary to justify whether attributes, behaviour, or both will suffice as independent variables. If behaviour is chosen, one again faces the problem of indeterminate causal chains. As other studies have demonstrated¹⁹, models such as the stimulus-response framework have become bogged down with conceptual difficulties, definitional boundary problems, and an inability to extract an effective explanation of behaviour, such explanations often bordering on tautologies.²⁰ Thus, at a preliminary stage of analysis, it seems more fruitful to focus on dyadic attributes than dyadic behaviour as an independent variable. Again, justification for such an approach is abundant in the literature.²¹

It is important, however, to clarify the nature of a dyadic attribute. Attributes are those characteristics and features of an object under study which serve to id,

entify it as a member of a class of such objects, and to distinguish the object from other objects in the same class. Thus, as a nation-state has attributes, so too does a dyad. The notion of dyadic attributes has been used by others in the field, and has often been labelled as a "distance" between nations in measurable characteristics of those nations. In other words, an attribute of a dyad would be the difference or similarity between the two nations of the dyad in a particular characteristic which both share. Rummel, borrowing the concept from Wright, has stated:

...., for nations it is social, economic, political, and geographic distances that influence international behaviour The crucial concepts within the two systems deal not with magnitudes, but with distances between nations in the attribute system and directed behaviour between nations in the behavioural system.²²

In conclusion, this study posits the proposition that dyadic attributes of pairs of nation-states can explain and predict the directed dyadic behaviour manifested between them.

Footnotes (Chapter 1)

1. See the first part of the article by C.A. McClelland, "On the Fourth Wave: Past and Future in the Study of International Systems," in The Analysis of International Politics, ed. by J.N. Rosenau, V. Davis, and M.A. East, (New York: Free Press, 1972), pp. 15-40.
2. Governments are drawing up more comprehensive foreign policy goals and strategies such as embodied in Canada's 1970 foreign policy review, and the 1972 statement regarding options for future Canadian-American relations. As well, more governments are, like the American, employing sophisticated methods such as PPBS and other systems to rationalize decision making.
3. Title of a compendium of quantitative studies in international relations by S.D. Jones and J.D. Singer. Beyond Conjecture in International Politics, (Itasca, Ill.: F.E. Peacock, 1972).
4. See the articles in K. Knorr and J.N. Rosenau (eds.) Contending Approaches to International Politics, (Princeton Univ. Press, 1969).
5. See H. Starr, "The Quantitative International Relations Scholar as Surfer: Riding the 'Fourth Wave'," Journal of Conflict Resolution, Vol. 18, No. 2, June 1974, pp. 336-368.
6. From the article by J.D. Singer, "The Incomplete Theorist: Insight without Evidence," in Contending Approaches to International Politics, op. cit., pp. 62-86.
7. The international system has often been characterized as anarchic, although increasing global interdependence allows less iconoclastic national behaviour.
8. The Common Agricultural Policy of the E.E.C. instituted a crisis among several of its members in 1965 that almost brought about the collapse of the Common Market.
9. Arend Lijphart discussed this type of behaviour with regard to "consociational democracies" such as exist in the Netherlands.
10. B.M. Russett, International Regions and the International System, (Chicago: Rand McNally, 1967), p. 192.

11. See such works as K. Waltz, Man, the State, and War, (New York: Columbia Univ. Press, 1959), A. Rapoport, Fights, Games and Debates, (Ann Arbor: Univ. of Michigan Press, 1960), and C. Pentland, International Theory and European Integration, (New York: Free Press, 1973).
12. C.W. Kegley Jr., S.A. Salmore, and D.J. Rosen, "Convergencies in the Measurement of Interstate Behaviour," in Sage International Yearbook of Foreign Policy Studies, ed. by P.J. McGowan, Vol. 2, 1974, p. 310.
13. Although the authors dealt with in the next section of the paper (Wright, Rummel, Rosenau, Galtung and others) all utilize the concept of a dyad in one form or another, Rummel noted that, "Much of the aggregate analysis, theory, and research in international relations is on the characteristics and behaviour of the nation itself and not on the nation in relation to some particular other one.... Yet, we know that a nation's policies and behaviour shift depending on the object nation, and whether development, power, or any other variables are relevant will also shift by object." in R.J. Rummel, "U.S. Foreign Relations: Conflict, Cooperation, and Attribute Distances," in Peace, War, and Numbers, ed. by B.M. Russett, (Beverly Hills: Sage Publications, 1972), pp. 78-79.
14. See C.W. Kegley, A General Empirical Typology of Foreign Policy Behaviour, Sage Professional Papers in International Studies, 1973.
15. See J.D. Singer's discussion in "The Level of Analysis Problem in International Relations," World Politics, Vol. 14, 1961, pp. 77-92. Also, see the discussion in Part I of M. Haas' International Conflict, (New York: Bobbs-Merrill, 1974).
16. Examples are R.C. Snyder, H.W. Bruck and B. Sapin, "The Decision-Making Approach to the Study of International Politics," in International Politics and Foreign Policy, ed. by J.N. Rosenau, (New York: Free Press, 1969), pp. 199-206, and G.T. Allison, "Conceptual Models and the Cuban Missile Crisis," in Comparative Foreign Policy, ed. by W.F. Hanrieder, (New York: David McKay, 1971), pp. 322-384.
17. Examples are M.A. Kaplan, System and Process in International Politics, (New York: John Wiley, 1957), and C.A. McClelland, Theory and the International System, (New York: Macmillan, 1966).

18. Studies by Rummel, Tanter, and Wilkenfeld demonstrated that there was very little relationship between past or present domestic conflict behaviour and present foreign conflict behaviour. Also, Rummel, in his article, "The Relationship between National Attributes and Foreign Conflict Behaviour," in Quantitative International Politics, ed. by J.D. Singer, (New York: Free Press, 1968), pp. 187-214, found very little relationship between a number of national attributes and foreign conflict behaviour.
19. See, for example, a discussion of learning theory in J.D. Raser, "Learning and Affect in International Politics," pp. 432-441, and of stimulus-response theory in O.R. Holsti, R.A. Brody, and R.C. North, "Measuring Affect and Action in International Reaction Models: Empirical Materials from 1962 Cuban Crisis," pp. 679-696, both in International Politics and Foreign Policy, (1969), op. cit.
20. A book by G.C. Homans, Social Behaviour, (rev. ed.), (New York: Harcourt, Brace, Jovanovich, 1974), discusses some of these problems. See particularly Chapters 2 and 7 wherein he discusses tautologies and causal chains involving feedback.
21. Again, this will be dealt with in the following section of the paper, but the reader may refer to the work of Wright, Rummel, and Wilkenfeld listed in the bibliography. A study that compared attributes and behaviour as independent variables, however, demonstrated that previous behaviour was more useful in explaining on-going behaviour, at least in regard to informal alignments. See J.D. Sullivan, "Cooperating to Conflict: Sources of Informal Alignments," in Peace, War, and Numbers, (1972), op. cit., pp. 115-138.
22. Rummel, in Quantitative International Politics, op. cit., p. 214.

CHAPTER II

Theoretical Overview

In order to fit this study into the context of past and on-going developments in the literature, it is necessary to review the work of those authors whose efforts have provided the theoretical impetus for this analysis.

Quincy Wright was one of the first scholars to deal with international relations using a broad conceptual framework.¹ He suggested that:

... the world may best be conceived as a field, a dynamic complex of relations among groups and individuals developing knowledge of which may increase the capacity of man to know his interests and his conditions, and to control his destiny by continually recreating his world in the image best synthesizing the progress and stability of these systems of action as they change under his touch.²

A field is a "system defined by time and space or by analytical co-ordinates, and by the properties, relations, and movements of the entities within it."³ In his first conception of field theory, Wright⁴ posited that eight "distances" between nations (technological, strategic, legal, intellectual, social, political, psychic, and war-expectancy) would delineate those patterns in the field determining the behaviour of nations toward one another. Later, Wright⁵ modified and refined this by first distinguishing between

a geographical field (to encompass "ongoing international processes that are specific to time and place in the world"⁶), and an analytic field, with which he dealt at length. This analytic field envisaged locating nations on six capability and six value continuums⁷ "within which systems of action can be located; the rapidity and direction of movement of each depending in considerable measure upon the relation of its four structural levels."⁸ These structural levels (biological, social, psychological, and action) determine the nature of systems of action.

As a creative and fruitful exercise in attempting to generate a complex theory of international relations, Wright's approach is to be commended. However, he did not specify the nature of the linkages between structural levels, attribute continuums, and resulting interstate behaviour, leaving in doubt the manner in which his theory could be tested.

This task was taken on by Rummel, the major exponent of Wright's theoretic formulations. Rummel took Wright's verbally structured statements and adapted them to a mathematical structure involving correlation, regression, and factor analysis.⁹ Both Rummel and Wright expressed "the view that external relations between social units of analysis (or entities) are determined and predicted by the internal characteristics of these units or entities."¹⁰

At this juncture, a brief digression regarding a systems

analysis approach to international relations theory is necessary. Two fundamental assumptions in systems theory¹¹ state that:

1. a system is more than the sum of its parts, and
2. the state of the international system will determine inter-state behaviour.

These assumptions are in direct contradiction to field theoretic notions. The decision to accept or reject one of these conflicting sets of assumptions depends on the confirmability and intuitive reasonableness of the derived consequences of the assumptions. Although the two competing approaches are complementary in endeavouring to relate parts to the whole (or vice versa), the field theoretic formulation has been more successful in making concrete and testable its hypotheses.

Nevertheless, McClelland, favouring the systems approach, has stated:

It appears that, in general, the system approach is the better vehicle for analysing and explaining international political processes, and that the field approach is the better means for establishing the all-important settings in which these processes occur.¹²

However, given the emphasis on process, the systems perspective loses specificity in its attempts to be comprehensive. The field approach, using a greater variety of explanatory variables, appears to be functionally more specific in examining interstate behaviour. Thus, while both approaches are, in a sense, concerned with the international system, the

systems framework provides better descriptions of international processes, while the field framework allows for more fruitful explanations of specific processes.¹³ In other words, if interstate behaviour is the central concept under study, the systems approach is better suited to determining the consequences of that behaviour, whereas the field approach is better suited to determining the causes of that behaviour. Given that this particular analysis is devoted to establishing the dyadic determinants of dyadic behaviour, the approach taken by this author adheres more closely to the field theoretic perspective.¹⁴

Rummel's work on field theory has passed through three stages: attribute, social field, and status field theories. Attribute theory began as an attempt to discover inductively through the use of factor analysis, the dimensions of attributes and behaviour that characterize nations. Rummel postulated the existence of two Euclidean spaces, attribute (A) and behaviour (B), in which each nation could be located. In doing so, he attempted to account for the variance in behaviour by the variance in attributes. Since this produced inconclusive results, provided no explanatory power and treated all nations under "ceteris paribus" conditions, Rummel developed social field theory. Attention was shifted from monads to dyads, in order to facilitate greater understanding of the interactive behaviour of nation-pairs. "Social field theory

asserts that the behaviour of [nation] i to [nation] j may be accounted for by their distance, computed from their factor score location on their attribute dimension."¹⁵ From this statement, it can be inferred that Rummel relied heavily on factor analysis, not simply to test his hypotheses, but to serve as an adjunct to his mathematically-based theory. Given Rummel's fundamental assertions regarding Euclidean, linearly geometric, spaces, factor analysis provides the concrete basis for defining these spaces in terms of attribute and behaviour dimensions.

- To test social field theory, Rummel developed two models, each of which related the behaviour of a dyad on a particular dimension to the linear addition of distances between the two nations on all of the attribute dimensions. However, the first model, in attempting to generalize across all dyads, applied similar weights to the parameters which defined the attribute dimensions. In subsequent tests, this model was replaced by one which linked these parameters to the acting nation in the dyad. An improvement realized by this change was that dyadic behaviour was no longer necessarily considered as being symmetrical. In other words, Model II allowed for the behaviour of nation i to nation j to differ from that of nation j to nation i.

Figure 1 provides a rough graphic description of the two models.

FIGURE 1

$$\text{Model I formula} \quad -- \quad w_{i \rightarrow j, n} = \sum_{x=1}^m a_x * d_{x, i-j}$$

$$\text{Model II formula} \quad -- \quad w_{i \rightarrow j, n} = \sum_{x=1}^m a_{i, x} * d_{x, i-j}$$

where: i = nation i ; j = nation j ; $w_{i \rightarrow j, n}$ = projection of

behaviour of i to j on the n 'th dimension of behaviour space (a numerical factor score representing the behaviour of type n from i to j); a_x = weighting factor for all dyads on attribute x ; $a_{i, x}$ = weighting factor specific to nation i on attribute x ; $d_{x, i-j}$ = distance (difference) vector between i and j on the x attribute dimension of attribute space (a numerical difference in factor scores of the two nations on attribute x).

Thus, the relative positions of nations in abstractly defined attribute space result in dyadic algebraic distances between them which act as forces determining the behaviour (or position) of dyads in behaviour space. In other words, relative dyadic behaviour is a resolution of the weighted attribute distance vectors. For a more complete description, the reader should consult R.J. Rummel. *The Dimensions of Nations*. (Beverly Hills, Calif.: Sage, 1972).

Although, when tested, Model II produced better results than Model I, Rummel felt the need to substantiate his theory further. As he stated:

Field Theory has an explicit axiomatic and mathematical structure specifying the form of relationship between international behaviour and attribute distances, but not the direction of the relationship. That is, although postulating how behaviour links to attribute distances, Field Theory does not indicate which specific behaviour is a consequence of particular positive or negative attribute distances. Field Theory therefore appears as a mathematical skeleton, somewhat barren of substantive meaning and implications.¹⁶

Rummel, then, developed an extension of social field theory which he called status field theory. Here, he attempted to incorporate the more verbally-structured linkage "pre-theory" of Rosenau¹⁷ and the social status theory of Galtung¹⁸ into his reformulation, which, in effect, is subsumed under his general field theoretic framework. Rummel stated that the international system is stratified, with nations having a status rank as an attribute on two particular dimensions: economic development and power. Retaining his previous foundations based on "distance" and dyadic interaction, Rummel further posited the assumptions that nations desire upward status mobility, and that nations desire to balance an unbalanced status situation. Initially, Rummel tested three hypotheses arising from these assumptions, relating differences in status rank within dyads on development and power attributes to conflictual or co-operative

behaviour, depending on whether the actor was higher or lower in status than the target nation. Although refinements of this approach continue (i.e., relative status field theory), results remain somewhat unsatisfactory.¹⁹ There were no conclusive links between nations of dissimilar rank on the two status dimensions and resultant conflict behaviour, but preliminary tests substantiated the link between similar status ranks and co-operative behaviour between two nations.

This particular analysis borrows heavily from Rummel's work with respect to his assumptions on the dimensionality of attributes and behaviour of states. Furthermore, this author will test some hypotheses derived, in part, from Wright's notion of attribute distance, as defined by Rummel. Finally, the author concurs with Rummel's emphasis on dyadic interaction as the dependent variable.

However, there are some weaknesses in Rummel's work.²⁰ These failings centre upon the inductive nature of his analysis, as well as a related problem regarding the difference between explanation and prediction. By dimensionalizing attributes and behaviour inductively, Rummel provides no criteria for the acceptance or rejection of these dimensions. Only a deductive approach would provide the epistemological and falsifiable grounds to justify the derived dimensions. The other weakness concerns Rummel's equating prediction to explanation. As he stated, "... the explanation of

phenomena is nothing more than being able to predict or mathematically relate phenomena."²¹ However, Hilton, considering that Rummel eventually altered his position, noted:

Consequently, Rummel's position can best be summed up in a statement that explanation is a higher form of scientific endeavour than prediction; whereas predictions are true or false, explanations are acceptable or not.²²

Nevertheless, it appears that Rummel has not yet achieved causal explanations applicable in as general a sense as his mathematical statements linking attributes to behaviour. This author feels that, while predictions can be made numerically (or statistically), explanation is a verbal (or nomological) exercise.²³

Rummel has made some attempts to rectify these weaknesses by applying his theory to the works of Rosenau and Galtung, among others. As will be seen, these tests have been only partial and do not provide conclusive evidence that field theory is capable of subsuming other major theoretical constructs in the discipline. In fact, the infrequency with which these various authors cite each other's work is mute testimony to the diversity of perspectives applied to enquiries into the causes and consequences of interstate behaviour. However, since this author's analytical framework, in part, has been influenced by Rosenau and Galtung, the overview turns to an examination of their approaches.

In the middle 1960's Rosenau, dissatisfied with the disparate approaches of foreign policy studies, and the consequent failure of analysts to consolidate their efforts, developed a so-called "pre-theory" of foreign policy whereby he provided "a basis for analyzing foreign policy by identifying the major factors bearing on it that are given to comparison."²⁴ By pre-theory, Rosenau meant both:

... an early step toward explanation of specific empirical events and a general orientation toward all events, a point of view or philosophy about the way the world is. Ideally, pre-theories would be limited to the former meaning, but this requires that a field be in general agreement about the 'proper' orientation toward its subject matter, a situation which the field of foreign policy research is far from even approximating.²⁵

By noting that foreign policy analysis explains behaviour in terms of five sets of variables (idiosyncratic, role, governmental, societal, and systemic), Rosenau devised a scheme whereby these five variables could be ranked according to explanatory potency "in terms of distinctions between large and small countries, between developed and underdeveloped economies, and between open and closed political systems."²⁶ In so doing, he accomplished what Rummel did not: a deductive scheme linking attributes of nations to their behaviour. Furthermore, in order to overcome problems caused by the maintenance of a rigid distinction between national and international political systems, and the fact that systems function differently according to the type of issue involved, Rosenau added two variables to

the typology. To account for the national-international distinction in analysis, Rosenau proposed to distinguish nations by the degree to which their political systems were penetrated by the international political system in terms of external influences on behaviour. Secondly, he devised an arbitrary division of issue areas (territorial, status, human resources, and non-human resources), in endeavouring to account for the diversity in the external behaviour of states. Thus, using five attributes of nations, he ranked the five explanatory variables in order of their expected salience in explaining foreign policy behaviour.²⁷ Rosenau thereby provided analysts with a conceptual framework enabling the production of comparative generalizations about the determinants of such behaviour.

Although useful for the task of systematizing observation techniques, Rosenau's "pre-theory" failed to establish links between the independent variables and types of behaviour, did not explain why the pattern of variables he derived was expected to exist, and did not define the dependent variable, foreign policy behaviour, at all. Not until his later work on foreign policy as adaptive behaviour²⁸ did these problems approach resolution.

By defining nations in terms of four structures (physical, economic, political, and social), he stated that:

Any foreign policy behaviour undertaken by the government of any national society is conceived

to be adaptive when it copes with or stimulates changes in the external environment of the society that contribute to keeping the essential structures of the society within acceptable limits.²⁹

In further specifying typologies of foreign policy strategies and behaviours, Rosenau progressed greatly in developing a general positive theory of foreign policy.

However, McGowan has noted some weaknesses in Rosenau's approach³⁰ which, he stated, "relate to the logical character of his concepts and definitions, and most particularly, to the absence of a deductive structure of definitions, axioms, and general theorems."³¹ Thus, although a general taxonomy is arrived at using partially deductive methods, there is no proper deductive framework relating all the derived terms to each other. Nevertheless, in specifying a linkage between national attributes and external behaviour, using a rich conceptual framework, Rosenau has added substance to Rummel's more mathematically-oriented work.

In fact, as mentioned previously, Rummel applied his framework to that of Rosenau in an empirical test, in which he found a linkage, albeit weak, between the attributes of economic development, size, and political orientation to American external behaviour.³² Although Rosenau's analysis was directed at the monadic level of interstate behaviour, rather than the dyadic level, this author is convinced enough, of the general soundness of Rosenau's taxonomy, to posit

certain of his hypotheses as assumptions underlying the hypotheses presented in this analysis. This will be dealt with at a later stage in the paper.

To continue, however, it appears likely that not only Rummel, but Rosenau as well, have borrowed from Galtung's efforts at theory construction. Galtung was the first international relations scholar to apply the sociological concept of status-disequilibrium³³ to the study of interstate behaviour. Focusing on aggression³⁴, Galtung explained its occurrence by the assumption that the international interaction system is a multidimensional system of stratification, whereby nations are ranked according to achieved and ascribed status on various attributes. Thus, where a nation experiences rank disequilibrium or status inconsistency between its achieved and ascribed (by other nations in the system) status on salient dimensions, relative to the nations with which it interacts, aggression will occur to mitigate the disequilibrium. Rosenau incorporated this notion into his "pre-theory" by stipulating status as one of the issue areas which characterize the determinants of foreign policy behaviour. As well, Rummel incorporated status difference into his previous concept of "distance", equating status inconsistency to the difference between two nations on the attribute dimensions of economic development and power.

Although Galtung was not explicit about his definition of aggression, nor about his suggestions as to which attribute dimensions would be most salient, his analysis spurred a number of empirical tests relating status inconsistency to war. In one such test, Rummel³⁵ indeed found that the actions of the U.S. toward other nations was a function of their relative status. However, in more direct tests of Galtung's theory, although the hypothesized relationship between status inconsistency and conflict level held at a systemic level, it did not account for many important individual national variations in conflict behaviour.³⁶

Galtung followed this work with one focusing on peace³⁷, which was essentially the obverse of his previous analysis. In fact, his definition of peace was simply the absence of violence. Consequently, he defined the conditions for peaceful or co-operative exchanges between nations as being determined by their "symmetry" in terms of structure, size, traditions, efforts put into the exchanges, and benefits gained from them. This theory was not directly testable in that it was basically prescriptive rather than explanatory. As well, although implicit, there was no overt effort made to equate status inconsistency with "asymmetry", thus leaving any attempt to combine the two theories in doubt.

In an essay whereby he provided a "conceptual umbrella" for these (and other) approaches, Galtung introduced the

concept of entropy as a variable characterizing the distribution of properties in a system. He stated that, "a system has high entropy if the distribution is of such a kind that it permits low predictability of the property for any given element; low if the predictability is high."³⁸ Galtung pictured the international system as swinging back and forth between states of high and low entropy for the dialectical reason that either state is inherently unstable, and forces acting either at the systemic (macro) or subsystemic (micro) level are in continual tension. Also, he added to his concept of entropy that of dissociative and associative policies characterizing negative and positive interaction, respectively. He then related these concepts to most of the major constructs associated with peace research.

As an attempt to organize disparate approaches to the understanding of interstate behaviour, Galtung's entropy concept is useful. However, as a variable to be used in explaining behaviour, entropy seems unmanageable. It is unclear whether entropy is a cause or effect of systemic behaviour, nor is it clear whether Galtung considered the international system as being "open" or "closed" in terms of entropy levels. Even so, his discussion embraced a point made by other scholars studying systemic patterns of interaction.³⁹ Given his earlier assumptions regarding the relationship between symmetry and increased interaction,

he made the additional observation that increased interaction (under conditions of increasing entropy or broad distributions of interaction) would favour the emergence of more peaceful, less conflictual, interstate behaviour. It would be a useful exercise to discover whether these relationships hold. This particular study will attempt such a test, although at the dyadic, not systemic level of analysis.

In continuing the overview of scholars whose efforts have influenced this author's perspective, it is necessary to look at the work of those involved in the study of international or regional integration. At both the systemic and sub-systemic levels of analysis, the concern has been to understand the conditions and processes determining and consequent to the formation of international and supranational communities. The study of integration has moved through successive stages in efforts to arrive at testable hypotheses, as well as to cope with the variability of the "living laboratory" that serves as both an inspiration and obstacle to integration theorists.

Cobb and Elder produced an analysis that could be placed in the latter states of the integration school of literature (the transactionalist or pluralist cum neo-functionalist stage), for which they borrowed from previous work in both communications⁴⁰ and field⁴¹ theory. As they stated:

... the arguments from communications theory suggest a clear linkage between background variables and patterns of international interaction and collaboration. The various types of background factors provide an indication of the relative costs of interaction and allow us to assess the mutuality of capabilities and interest of two nations. Thus, the behavioural patterns of mutual relevance between nations may be considered a function of these background variables. Mutual relevance, in turn, will enhance the probability of formal collaborative arrangements arising between nations.... It may be observed that the variables defining unit attributes in social field theory correspond rather closely with those used to define unit capabilities in communications theory. But while communications theory tends to emphasize the level, or magnitude, of these attributes or capabilities, field theory directs our attention to their comparability or similarity, thus underscoring the importance of what we have called the capacity to interact.⁴²

Defining mutual behavioural relevance or responsiveness as the scope and intensity of interstate interaction, Cobb and Elder hypothesized that the mutual relevance of two nations is a function of three background factors (geophysical, unit, and systemic properties) associated with that pair. Secondly, they posited a direct relationship between increasing mutual relevance established through interaction and consequent increasing formal collaborative arrangements between governments. Although describing their model as simple and heuristic, they proceeded to enunciate and test several propositions derived from the model. The empirical analysis was generally supportive of the model:

However, Cobb and Elder qualified their model by suggesting that further work was necessary to demonstrate

congruence between various indicators of integration. In effect, regions and systems exhibiting mutual relevance may or may not be integrative depending on the definition of integration. Nevertheless, since this author's study is not concerned with integration as a phenomenon per se, Cobb and Elder's arguments and conclusions, to a certain extent, are relevant to the ensuing analysis.

In conclusion, all the authors mentioned have studied the linkage between attributes and behaviour of states. The over-riding determinant of behaviour appears to be that of the differences between states on specific attributes. This difference (or distance, or symmetry, or status inconsistency) has been utilized in explanations of war, peace, integration, as well as general behavioural typologies. Generally speaking, the scholars have noted that as similarity increases, interaction increases. Increasing "likeness" or "sameness" between nations has also been linked to decreasing conflictual and increasing peaceful behaviour. Although sometimes obscured by semantic manipulations, the analyses have dealt with nations in pairs or dyads to posit their assumptions and conclusions. It is these conclusions that provide this author with the justification for suggesting that the attributes of pairs of nations can explain and predict their resultant behaviour.

The following section will describe the operational procedures used in measuring the independent and dependent

variables of this analysis, as well as the manner in which the relationships between them will be tested.

Footnotes (Chapter 2)

1. Quincy Wright, A Study of War, (Chicago: Univ. of Chicago Press, 1942), 2 Vols.
2. Q. Wright, "The Form of a Discipline of International Relations," in International Politics and Foreign Policy, ed. by J.N. Rosenau, rev. ed. (New York: Free Press, 1969, p. 455.
3. Ibid., p. 442.
4. Q. Wright, (1942), op. cit.
5. Q. Wright, The Study of International Relations, (New York: Appleton-Century Crofts, 1955).
6. C.A. McClelland, "Field Theory and System Theory in International Politics," (Mimeo, Univ. of Southern California, June 1968), p. 22.
7. The six capability dimensions are i) flexibility-rigidity, ii) lethargy-energy, iii) strength-weakness, iv) isolation-cooperation, v) technological advancement-technological backwardness, and vi) resource poverty-resource abundance. The six value dimensions are i) abstractness-concreteness, ii) subjectivity-objectivity, iii) situation orientation-self orientation, iv) restrictiveness-liberality, v) manipulation-contemplation, and vi) negation-affirmation.
8. Q. Wright, (1969), op. cit., p. 447.
9. R.J. Rummel, "Dimensions of Conflict Behaviour Within and Between Nations," General System Yearbook, Vol. 8, (1963), pp. 1-50, and "A Field Theory of Social Action with Application to Conflict within Nations," General Systems Yearbook, Vol. 10, (1965), pp. 183-211.
10. C.A. McClelland, (1968), op. cit., p. 18.
11. See, for example, L. von Bertalanffy, "General System Theory," General Systems Yearbook, Vol. 1, (1956), pp. 1-10; D. Easton, The Political System: An Inquiry into the State of Political Science, (New York: Knopf, 1953); and M.A. Kaplan, System and Process in International Politics, (New York: John Wiley, 1957).

12. C.A. McClelland, (1968), op. cit., p. 18.
13. Refer again to J.D. Singer's "The Level of Analysis Problem in International Relations," World Politics, Vol. 14, 1961, pp. 77-92.
14. Rummel defined a system as a pattern in a field, stating that field theory had a more precise and effective formulation than systems theory. However, a caveat must be included here regarding the element of time. Field theory, for the most part, deals with phenomena in a static time framework, whereas much of the systems literature deals with changes in the system over time. It is difficult to see how time could be incorporated into field theory as it is promoted by Rummel. See his discussion "Social Time and International Relations," in General Systems Yearbook, Vol. 17 (1972), pp. 145-158.
15. J.E. Vincent, et al., "Empirical Tests of Attributes, Social Field, and Status Field Theories on International Relations Data," International Studies Quarterly, Vol. 17, (1973), p. 433.
16. G. Hilton, A Review of the Dimensionality of Nations Project, Sage Professional Papers in International Studies, (1973), p. 28.
17. See J.N. Rosenau, "Pre-theories and Theories of Foreign Policy," in Approaches to Comparative and International Politics, ed. by R.B. Farrell, (Evanston, Ill.: Northwestern Univ. Press, 1966), pp. 27-92.
18. J. Galtung, "A Structural Theory of Aggression," Journal of Peace Research, Vol. 1, (1964), pp. 95-119.
19. J. Vincent, "Attribute and Attribute Distance Theories of International Behaviour: An Overview," (Mimeo, Florida Atlantic Univ., March 1974).
20. See G. Hilton, (1973), op. cit., especially Chapter 5.
21. Ibid., p. 59.
22. Ibid., p. 60.
23. A. Kaplan noted that, "An explanation rests on a nomological or theoretical generalization, or on an intelligible pattern, but a prediction need not have such a basis." An empirical generalization is sufficient as a basis for prediction. (p. 350). See The Conduct of Inquiry, (San Francisco: Chandler, 1964).

24. From a review of Rosenau's "pre-theory" in Analyzing International Relations, ed. by W.D. Coplin and C.W. Kegley Jr., (New York: Praeger, 1975), p. 47.
25. J.N. Rosenau, (1966) op. cit., p. 41.
26. Ibid., p. 47.
27. Ibid., p. 90-91, (Table 4).
28. See Rosenau's articles on adaptive behaviour. "Foreign Policy as Adaptive Politics," Comparative Politics, Vol. 2, (1970), pp. 365-389, and "Adaptive Politics in an Interdependent World," Orbis, Vol. 16, (1972), pp. 153-173.
29. J.N. Rosenau, (1970), op. cit., p. 367.
30. Refer to the article by P.J. McGowan, "Problems in the Construction of Positive Foreign Policy Theory," in Comparing Foreign Policies, ed. by J.N. Rosenau, (New York: John Wiley, 1974), pp. 25-44.
31. Ibid., p. 41.
32. Refer to Rummel's article "U.S. Foreign Relations: Conflict, Cooperation, and Attribute Distances," in Peace, War and Numbers, ed. by B.M. Russett, (Beverly Hills: Sage, 1972), pp. 71-113.
33. Galtung, (1964), op. cit. In the article, Galtung cites a number of renowned authors who have studied the concept of rank-disequilibrium (E.F. Jackson, J.C. Davis, Gustavo Lagos, etc.). G.C. Homans, in Social Behaviour, rev. ed. (New York: Harcourt, Brace, Jovanovich, 1974), cites the following proposition: "When a person's action does not receive the reward he expected, or receives punishment he did not expect, he will be angry: he becomes more aggressive...." (p. 37) Although referring to the individual, similar propositions have been applied to groups and nations.
34. Galtung, (1964), op. cit. Galtung defined aggression as a "drive towards change, even against the will of others." (p. 95) Although he concerned himself primarily with extreme forms of aggression harmful to others, he admitted the definition was somewhat vague.
35. See Rummel, (1972) op. cit.

36. Examples are M.A. East, "Status Discrepancy and Violence in the International System," in The Analysis of International Politics, ed. by J.N. Rosenau, V. Davis, and M.A. East, (New York: Free Press, 1972), pp. 299-319; and M.D. Wallace, "Power, Status, and International War," Journal of Peace Research, Vol. 1 (1971), pp. 23-35.

Also, problems were encountered regarding time lags between status inconsistency and war, as well intervening variables related to arms races and the formation of international organizations.

37. J. Galtung, "A Theory of Peaceful Co-operation," in Co-operation in Europe, ed. by Galtung, IPRA Studies in Peace Research, Vol. 3, (New York: Humanities Press, 1970), pp. 9-18.
38. J. Galtung, "Entropy and the General Theory of Peace," IPRA Proceedings, Vol. 1, (1968), pp. 3-37.
39. See the articles: K.N. Waltz, "International Structure, National Force, and the Balance of World Power," pp. 304-314; and K.W. Deutsch and J.D. Singer, "Multipolar Power Systems and International Stability," pp. 315-342; both in International Politics and Foreign Policy, op. cit. Although the articles reach opposite conclusions, both discuss the effect on international stability of a proliferation of powers, particularly nuclear powers. Thus, they attempt to relate distributional properties of the system to the peaceableness or stability of the system.
40. See primarily K.W. Deutsch, Nerves of Government, (New York: Free Press, 1963).
41. R.J. Rummel, (1965), op. cit.
42. R.W. Cobb and C. Elder, International Community, (New York: Holt, Rinehart and Winston, 1970), p. 9, and p. 11.

CHAPTER III

Deductive Framework

As stated by the title, and implied in the Introduction, this study is a quantitative analysis. In the past, there has been a certain amount of confusion relating to and criticism directed at studies in international relations that were quantitatively oriented.

Whereas initially debate "centred on the possibility of quantifying important variables, and of establishing empirically based generalizations about international behaviour,"¹ later arguments focused on the relative merits of inductive searches or deductive schemes in scholarly analyses. On one hand, Beres noted:

... the opinion is widely held that social science simply cannot meet the requirements for deductive explanation because it does not have now, nor is it likely to have in the future, the 'nomic empirical generalizations' or 'empirical laws' which such explanation demands.²

On the other hand, for example, Young greatly criticized Russett's empirical work in delineating international regions, focusing on what he (Young) termed "puristic induction."³ In his defence, Russett stated that:

Critics of induction too often fail to realize that the mere selection of variables for inductive analysis is necessarily based on some theory, however vague or implicit. [Even though] induction has sometimes been

likened to engaging in a fishing expedition ... some inchoate theory must specify what the most promising variables for the inductive exercise are to be, and he [the analyst] had better understand the kind of functional relationships that his procedures are seeking.⁴

Although deductive methods (building abstract models from a limited number of postulates) and inductive methods (identifying significant features of concrete reality to provide order) are frequently contrasted⁵, both are essential to the process of theory construction. As Rudner noted:

The vulgar notion that induction and deduction are 'opposites' as well as its equally untutored concomitant notions that deduction is 'going' from the general to the particular, and induction is 'going' from the particular to the general, are not only quite mistaken, but seriously misleading. Not only is deduction not restricted to inference from the general to the particular, but also, induction - which comprises the selection of hypotheses - does frequently involve, as one of its steps, the making of a deduction.⁶

Recognizing this, the scholar should be aware nonetheless, of the proper context of each method in a theory-building exercise.

Beres, in his analysis of the effectiveness of power-management in the world system⁷, has exemplified such an exercise. Using a number of models as guides, he deductively elaborates a series of assumptions for their power-management implications within the setting provided by the models.

Empirical material can serve us only in selecting explanatory premises and for "checking" the abstract propositions developed deductively within these models.... Each model defines a particular universe of cases to which the resultant empirically-testable propositions will be relevant....⁸

Although some of the assumptions may be inductive generalizations, the resultant conclusions of such assumptions must correspond with reality.

While how far the assumptions themselves correspond to fact is a problem left to further inquiry, the deduced propositions must ultimately be verified by empirical materials. Induction has a verificatory function after the completion of deduction, and induction and deduction are integral parts of one set of logical operations.⁹

In the field of international relations, attempts at theory construction have been diverse.¹⁰ Hoffmann, for example, classified these attempts according to degree of elaboration (questions, hypotheses, laws), scope, (partial, general), and object (empirical, philosophical).¹¹ Although the word has often been used loosely, this author adheres to Rudner's definition of theory: "... a systematically related set of statements, including some lawlike generalizations, that is empirically testable."¹²

The analyst begins with a series of assumptions (or postulates or axioms) defining the scope conditions of his model. These assumptions must be formulated such that:

1. they are free from self- or mutual contradiction,

2. they are independent of each other (no axioms are deducible from any of the others),
3. they are sufficient to deduce all remaining theoretical statements in the model, and
4. they are necessary in order to do so (there are no superfluous assumptions).

From these assumptions, logical consequences are derived that are stated in the form of testable, falsifiable hypotheses. The hypotheses must be stated in such a way as to have empirical referents, available to and observable by the tester. Upon repeated confirmation of an hypothesis, the statement of it will become law-like, and, if not disconfirmed, will become a proposition. A proposition is a broader, more inclusive and more abstract statement than an hypothesis. Although assumptions may be based on or similar to previously identified and accepted laws, propositions, hypotheses, or observations, and need not be tested for confirmability, they may require change or adjustment if the hypothesis based on them is not corroborated. The deduced hypotheses are then related to each other in a descending order of implication, from the highest level hypotheses which "only imply but never are implied" to the lowest level hypotheses which "only are implied but never imply".¹³ This complete and testable set of statements thus forms a theory.

Theories may be classified in various ways¹⁴ and evaluated according to a number of dimensions.¹⁵ Nevertheless,

few scholars in international relations would claim their work is theoretical in the strict sense described here. Likewise, this author makes no claim that the analysis which follows is a formal theory. At most, it is a partial theory consisting of low-level hypotheses describing phenomena. At least, it is a deductive framework of assumptions derived from previous analyses, having a limited amount of explanatory power, from which a number of consequences are extracted and stated in a form amenable to testing. Without further ado, the schema is presented as follows.

Assumptions

1. Nation-states are actors having goals and capable, to one extent or another, of directing actions to attain and maintain these ends.
2. All nation-states, in essence, have the same basic long-range objectives, goals, or ends - security, status, and stability.
3. All nation-states have, to one extent or another, some of the means or instruments - political, economic, and social - to attain and maintain these ends.
4. Due to the scarcity of resources and unequal global distribution of these scarce resources, any particular nation-state is not likely to have all of the means at

- its disposal to attain and maintain its ends.
5. Any particular nation-state will have means at its disposal which need not coincide with or be similar to means at any other nation-state's disposal.
 6. Nation-states are aware that all the means necessary to attain and maintain their ends are not likely to be found within their own borders or limits of national or territorial sovereignty.

Derived consequence 1

It follows that nation-states, as actors in the international system, will come into contact with one another in efforts to secure the additional means necessary to attain and maintain their ends.

At the outset, it should be noted that the foregoing series of assumptions and the derived consequence are a teleological explication of interstate behaviour. Most authors writing in the field of international relations impute, either explicitly or implicitly, purpose to the interaction of states. As stated by K. Holsti:

... most governments ... have some objectives that they are attempting to achieve through the ordering of various actions, and that reflect needs and purposes. Men grouped into nation-states and other types of political units have needs and purposes, many of which they can only achieve or meet by influencing the behaviour of other states...¹⁶

Even though Deutsch suggests an element of randomness in interstate behaviour, his "random walk" model nonetheless allows the scholar to make "difficult but interesting" predictions about the causes and consequences of such behaviour.¹⁷ As such, the first assumption is taken directly from Galtung.¹⁸ To assume otherwise would be self-defeating in any attempt to assess the determinants of interstate behaviour.

A second observation regarding this first section is that nation-states are treated as monolithic units with regard to their goals and behaviour. Needless to say, individuals are the ultimate sources of the behaviour of states and it is through them that goals are set, and appropriate actions are taken. However, this study, rather than dealing with the processes whereby decisions on goals and strategies are made, in effect, aggregates the countless decisions of individuals to the level of the nation-state acting as a unit. Depending on the focus of a particular study, this is not an unreasonable assumption. For example, Choucri and North, in a recent book¹⁹, examine the interaction of certain macro-level events in the international system (growth, expansion, and competition of nations). As a result, they are concerned only with the outcomes of decisions and not with the processes leading up to those decisions.

The second assumption in the foregoing sequence requires some clarification. To many theorists, the essence or prime determinant of interstate behaviour, particularly

conflict behaviour, has been the incompatibility of objectives of nation-states, with respect to their substance, number, scope, intensity with which they are held, flexibility with which they are pursued, urgency with which they must be achieved, etc. In fact, early game theoreticians held that the attainment of goals was a zero-sum (or at least a fixed-sum) game in that whatever goals a nation achieved occurred at the expense of some other nation's chances of achieving the same goals. However, this assumption is no longer imputed to the international system, and variable-sum games, allowing for the possibility of collective gain (or loss), are generally used as interpretations of international behaviour.

To clarify the second assumption, reference must also be made to the third assumption: this involves clarifying the difference between ends and means. K. Holsti has defined an objective as "essentially an 'image' of a future state of affairs and future set of conditions which governments through individual policy makers aspire to bring about by ~~wielding~~ influence abroad and by ~~changing~~ or sustaining the behaviour of other states."²⁰ The distinction between objectives and strategy (or ends and means) is, to a great extent, analytical. As Legg and Morrison noted, "Few things we think of as objectives are ends in themselves, but are rather means, in turn, for the achievement of still more abstract or distant ends."²¹ Thus, most scholars would agree

that security, status, and stability are ends to which governments and nations commit their very existence. In a sense, this author borrows from Parsons,² and Lasswell and Kaplan, in making such an assertion.

Parsons²² suggested that any social system must perform four functions: pattern maintenance, adaptation, goal attainment, and the integration of these functions. In essence, the drive toward the attainment and maintenance of security, status, and stability is a fulfillment of these functions. Lasswell and Kaplan²³ described eight primary values (power, enlightenment, wealth, well-being, skill, affection, rectitude, and deference) as those desired by states. They further specified six conditions under which these values could be enjoyed (security, liberty, integrity, dignity, legitimacy, and cognitive consonance). This study assumes, therefore, that the pursuit of the goals of security (from external or internal threats), status (respect for the political, economic, and social integrity of the nation from within and without), and stability (the continued ordered fulfillment of these values) are similar to and subsume the concepts of desired values and conditions postulated by Lasswell and Kaplan, and fulfill Parsons' required social system functions.²⁴

In stating this, the author presumes that goals are value-oriented and the means to achieve them more concrete

and materially-oriented. As such, ends are universal and their achievement limited only by the means available to nation-states in pursuing them.²⁵

The fact that nation-states have, to a greater or lesser degree, means to achieve their goals has frequently been analyzed from the perspective of the concept of power. For example, Morgenthau²⁶ developed a framework for examining interstate behaviour that centred on power. Much of the literature dealing with interstate relations during the Cold War revolved around such concepts as the balance of power.²⁷ Scholars such as the Sprouts²⁸ have long been involved with capability analysis, relating the capabilities of states to their objectives (what is to be accomplished) and strategies (by what course of action). For this study, means will be defined as those instruments or tools by which a nation-state is capable of directing actions toward the attainment and maintenance of its goals or ends. To separate means into classifications such as political, economic, and social is simply to underscore the diverse nature of the capabilities nations possess in order to pursue their goals.²⁹

In a world increasingly concerned with constraints and limitations on resources which, to one extent or another, comprise the basis for acquiring capabilities, it is clear that means are finite. No nation-state is capable of absolute self-sufficiency in the means necessary for it to realize its

goals. Choucri and North³⁰ have hypothesized that if needed capabilities cannot be attained using the existing capabilities within a nation-state, lateral pressure (the process of foreign expansion of any activity) will develop to acquire these capabilities. Thus, the consequence of the national pursuit of abstract, value-oriented ends within a global system of finite and unevenly distributed means is interaction among states in order to secure the additional means necessary for the attainment and maintenance of their security, status and stability.³¹

To continue with the presentation of the deductive framework of this study, the following assumptions and derived consequence are stated.

Assumptions

7. The actions one nation-state undertakes toward another, defined as directed dyadic behaviour, can be considered as having a distinct nature, pattern, or profile at any given point in time.
8. The affective nature of a nation-state's behaviour can be considered as being some combination of three basic types - co-operative, neutral, or hostile.

Derived consequence 2

It follows that the behavioural profile of one nation-state toward another, distinct from that of any other directed dyad, will take the form of peace, co-existence, or conflict,

or combinations of these three basic types.

In the previous theoretical overview, the author discussed the reasons for choosing dyadic behaviour as the dependent variable. Basically, the motive for such a choice is the recognition that nation-states rarely behave in a diffuse manner toward their external environment as a whole. Generally, the external actions of states have direct targets, and these targets are usually other states. Needless to say, there are other targets of behaviour such as international organizations, alliances, multinational corporations, etc. As well, states occasionally have no specific target for their external behaviour, such as superpowers calling for international peaceful cooperation, third world accusations against Western economic imperialism, or even physical attacks by terrorist groups. In general, however, diffuse international behaviour is verbal and not physical, and does not comprise a major portion of interstate behaviour. As such, it is beyond the scope of this study. Furthermore, given that the external behaviour of interest is target-oriented, the study focuses on directed dyadic behaviour. In other words, the behaviour of state A to state B will be considered as distinct from the behaviour of state B to state A.

A number of authors have studied interstate behaviour with a view to classifying it in certain categories. Such attempts arose out of the growth of the event data movement

stimulated by McClelland. Consequent studies have distinguished behaviour in terms of transactions and interactions, and concomitantly in terms of general outward-directed behaviour and target-directed behaviour.

McClelland defined transactions and interactions as follows:

Transactions are defined as items of action that have at some point in time become so numerous, so commonplace, and so normal to their situation that they are accounted for conventionally in an aggregated form, usually by some unit other than item frequency (i.e., dollar values of trade, numbers of troops in the field, etc.). Interactions are, by our definition, single action items of a nonroutine, extraordinary, or newsworthy character that in some clear sense are directed across a national boundary and have, in most instances, a specific foreign target.³²

Thus, if a chart is pictured, with a horizontal axis depicting time and the vertical axis depicting a combination of frequency and type of behaviour, transactions would take the form of a relatively flat horizontal line, with interaction peaks and troughs superimposed above the general "background noise" of routine interstate behaviour. In general, transactions are more diffuse in their orientation, whereas interactions have specific targets. For this study, interactions are the primary focus of interstate behaviour.

A further caveat regarding the directed dyadic behaviour under study concerns its source. Since nations are being treated as monolithic units engaged in purposive, goal-seeking behaviour, the study is primarily concerned with official

government behaviour, rather than unofficial interaction. Actions such as tourist flows, trade, mail, etc., although in a sense, often regulated by governments or their instruments, fall beyond the scope of the study.

The assumption that behaviour can be classified by the notions of co-operation, neutrality, or hostility has ample support in the literature. Rummel, in an empirical study³³, searching for patterns in the activities of nations directed toward and received from all other nations, found seven significant dimensions, of which two, labelled participation and foreign conflict, were the most important. In a later report³⁴, Rummel examined both the foreign behaviour of nations and dyadic international behaviour. Again, he found somewhat the same patterns for dyadic behaviour as for foreign behaviour, particularly in the conflict category. It should be noted, however, that not all his dimensions consisted of official government actions.

McClelland and Hoggard produced a study³⁵ examining the dimensions of official government behaviour directed at specific targets. In terms of frequency, they found that behaviour was approximately equally divided into three major categories: co-operation, conflict, and participation. Of the total amount of behaviour analyzed, 65% was verbal and 35% physical. Using factor analysis, they subsequently found four major factors (co-operation and collaboration, verbal conflict, military force, and diplomatic conflict) characterizing the behaviour of nations.

A final note on this section regards the lack of mutual exclusivity of these basic types of behaviour. There will be no assumption that these dimensions cannot co-exist in the same dyad simultaneously. The fact that peace, conflict, and neutrality (or participation) can co-exist was demonstrated in a study by Rosenau and Ramsey.³⁶ In analyzing data from three event data collections, they concluded that "the lack of differentiation between co-operative and conflictual behaviour is so uniform that it seems justified to abandon the original conception of them as the obverse of each other."³⁷

The following assumptions and derived consequence constitute the next section of the deductive framework.

Assumptions

9. Not every nation-state will necessarily come into contact with every other nation-state.
10. If a nation-state does undertake actions toward another nation-state, it need not necessarily be the case that the latter undertakes actions toward the former.
11. The original contact may stimulate a reaction in the contacted nation-state, but that reaction need not necessarily extend beyond its borders, nor specifically to the contacting nation-state.

Derived consequence 3

7. It follows that the behaviour manifested by one nation-state to another is not necessarily reciprocated by similar be-

haviour from the contacted nation, nor indeed by any behaviour whatsoever.

Although it appears that some stimulus-response models of international behaviour imply a Pavlovian national response to an external stimulus, this will neither be refuted nor accepted here. Firstly, it would seem that to assert that an action is always followed by a reaction is begging the question of what the determinants of international behaviour are. Secondly, this study is not longitudinal or dynamic and is thus not equipped to handle sequential behaviour. In this sense, it is similar to studies by Rummel, Rosenau, and others that are primarily cross-sectional or static in nature.³⁸

The next section of the deductive framework is stated as follows:

Assumptions

12. Some nation-states have a greater share of means at their disposal than other nation-states.
13. In order to be engaged in directed dyadic behaviour, it is necessary for a nation to utilize the means at its disposal.

Derived consequence 4

It follows that the greater the share of means available to a member of a dyad, the more likely the tendency for that member to be engaged in a higher frequency or amount of directed dyadic behaviour.

These assertions have been made elsewhere in the literature in a somewhat similar manner. For example, Choucri and North, although from a more dynamic perspective, made the following hypothesis and assumption.

The more advanced the level of technology in a society, the greater will be the kinds and quantity of resources needed by society to sustain that technology and advance it further.... Whether and how a society reaches for resources beyond its sovereignty is conditioned by location, level of population, level of technology, and the resources, technology, needs, power, and friendliness of neighboring states.³⁹

Cobb and Elder, arguing from a Deutschian communications perspective, asserted that capabilities are related to the level of interaction or communication load between two states. Borrowing from Russett⁴⁰, they noted that "the relevant capabilities are of two varieties. The first, which Russett has called the capacity to interact, is primarily dependent upon the administrative and material capabilities of the participating units."⁴¹ Subsequently, they related several background variables to the occurrence of interaction or transaction.

The first of these, geophysical properties, provide an indication of the material costs of intercourse between nations. The second set of variables refers to characteristics of the nations themselves and allows us to assess the mutual capabilities of two nations to act and interact.⁴²

It should be noted here that the derived consequence does not imply that a larger share of means accruing to a

member of a dyad automatically results in a greater frequency of behaviour to the other member. The implication is merely that the greater amount of means allows that member to engage in a higher frequency of behaviour than its target. In the aggregated conditions of this study, it will be assumed that increased means available to a member of a dyad implies the possibility of increased directed dyadic behaviour.

A cautionary observation should be made here regarding an apparent contradiction between derived consequences 1 and 4. Put bluntly, the contradiction is stated as follows:

- 1) the more means available - the less the need for interaction to acquire means - the less the interaction.
- 2) the more means available - the greater the capability to interact - the more the interaction.

This contradiction can be resolved as follows. Firstly, this study makes no attempt to match the use of particular means with the achievement of particular goals. The goals, as defined, are abstract, value-oriented, and long-range, and are assumed to be achievable using any particular combination of means. Thus, one nation may perceive certain means as more useful, valuable, efficient, or easily obtainable than another nation contemplating the same means. A nation may possess an abundance of means, with which it is able to interact, but does not regard these means as applicable to its goal-seeking behaviour. A nation with fewer

means available is less able to interact with others but nonetheless will do so in attempts to achieve greater capabilities and thereby approach the attainment of its goals.

Secondly, the first derived consequence, as stated in the contradiction, is somewhat misleading. The colloquial expression, "The more one has, the more one wants", is almost a truism. Many developed, apparently rich, nations are involved in an upward spiral of growth and resultant increased demands for more growth. Choucri and North recognized this spiral in making the following hypothesis:

Advances in technology, when combined with increases in population, often contribute to the dilemma of rising demands and insufficient domestic resources.⁴³

Thus, to resolve the contradiction, derived consequence 1, in blunt form, should be interpreted as follows:

1) the more means available - the greater the demand for still more means - the greater the need for interaction to acquire means - the more the interaction.

The following section of the deductive framework relates means to frequency or amount of behaviour.

Assumptions

14. Dyadic subsystems possess a property that is attributable to their similarity with respect to the share of means at their disposal.
15. The degree of equivalence between two members of a dyad with respect to the share of means at their disposal

is a property, defined as similarity, characterizing the dyadic subsystem.

16. The dyadic characteristic of similarity is of different salience to the frequency of the resultant directed dyadic behaviour, depending on the share of means at the disposal of the actor in the dyad, relative to the system.
17. The degree of similarity of means at the disposal of the two members of a dyad is indicative of equivalence in their respective capacities to engage in directed dyadic behaviour.

Derived consequence 5

It follows that the degree of similarity, relative to the system, in a dyadic subsystem, will "predict" the resultant behavioural profile, in terms of frequency, of the actor toward the target.

The foregoing statements have a certain amount of support in the existing literature. In the study in which Russett attempted to relate attributes of regional clusterings of nations to the conflict or integrative behaviour within the region, he drew the following conclusion:

When capabilities - and hence the mutual salience of two countries - are very low, violent conflict is likely to be absent. When capabilities and salience are moderate and narrowly focused, conflict may be quite common. But when capabilities are numerous and varied, the relationship is seldom marked by violence.

Although he did not focus on frequency of interaction in a general sense, nor on dyads as a unit of analysis, he did find evidence to support the conclusion that similarity within regions was related to increased interaction. However, he equated interaction to increased mutual salience, and, thus, possible integrative behaviour. A problem Russett discussed, that will be dealt with in the next section of this study, involved reciprocal causation between similarity and increased friendly interaction.

Cobb and Elder, in their study of international integration mentioned previously, attempted to equate various background factors to the characteristic of mutual relevance of pairs of nations (somewhat similar in intent to Russett's notion of mutual salience). This relational attribute was defined using the interaction variables of communication, trade, and the inter-nation mobility of the people in both states. The internal attributes of members of a dyad were defined so as to indicate both the extent to which the two nations shared a given attribute and the magnitude of the attribute present in the dyad. Thus, although their independent variables were similar to some used in this study, their dependent variable was different, as the focus of their study was integration. Nevertheless, a few of their results are repeated here:

As homogeneity of two nations with respect to socioeconomic development and average developmental level increases, the

greater their relative intercourse in the global system. There is a tendency for economically more powerful dyads to show more mutual relevance in the global system. This tendency is based on realized economic capabilities, not potential capacity.... by far the most important societal predictors of mutual relevance were found to be associated with a general developmental syndrome in the global system.⁵

In general, Cobb and Elder's results demonstrated that similarity in dyads with respect to various means at their disposal is indicative of increased transactions, as defined by McClelland. Whether or not there is a relationship between such transactions and the official government interactions of interest in this study remains an empirical question.

However, unlike most other studies which focus on cooperative and conflict behaviour per se, this section of the author's analysis relates similarity, as a defined dyadic attribute, to frequency, and not type of behaviour. The discussion of results in a later section of the paper will deal more concretely with comparisons of more recent findings related to this assertion. The final section of the deductive framework relates means to type of behaviour as follows.

Assumptions

18. Each nation-state allocates or distributes the means at its disposal in a particular manner.
19. Dyadic subsystems possess a property that is attributable to their homogeneity with respect to the manner in which these means are allocated or distributed.

20. The degree of equivalence between the two members of a dyad with respect to the manner in which they allocate or distribute the means at their disposal is a property, defined as homogeneity, characterizing the dyadic subsystem.
21. Homogeneity of allocation of means is indicative of the congruence in perspective of the governments of the dyad.
22. Nation-states in a dyad with congruent perspectives on the manner in which their ends can be realized are, by definition, mutually amicable.
23. The dyadic characteristic of homogeneity is of different salience to the type of the resultant directed dyadic behaviour, depending on the manner in which the actor in the dyad distributes its means, relative to the system.

Derived consequence 6

It follows that the degree of homogeneity, relative to the system, in a dyadic subsystem, will "predict" the resultant behavioural profile, in terms of type, of the actor toward the target.

There may appear to be some conceptual and logical difficulties associated with the foregoing assertions. Both assumptions 21 and 22 are tautological definitions involving the concept "congruent perspectives". If the only measure of a variable in a two-part definition is the measure of the other variable, the statement is tautological. To be

entirely logically correct, independent measures must be found for homogeneity, congruent perspectives, and mutual amicability. However, in deriving a consequence from these assumptions, the concept "congruent perspectives" will fall out and need never be measured. It is logically permissible to have tautologies in a deductive system if the derived conclusion is not tautological. In this instance, homogeneity can be independently measured (using the distribution of means in a dyad) from mutual amicability (using the type of directed dyadic behaviour in a dyad). Furthermore, the dropping out of the term "congruent perspectives" greatly facilitates testing since measures involving attitudes, beliefs, etc. are difficult both to obtain and to interpret.

Another problem involves reciprocation and circularity. Russett, like Homans, was faced with similar difficulties. In observing small groups, Homans stated:

The more frequently persons interact with one another, the more alike in some respects both their activities and sentiments tend to become. Moreover, the more a person's activities and sentiments resemble those of others, the more likely it is that interaction between him and others will increase. The process as usual works both ways.⁴⁶

Russett discussed this problem of reciprocal causation in the context of the international system. Whereas shared outlooks and socio-economic patterns promote greater frequencies of friendly behaviour, a high level of amicable interaction can also promote the evolution of similar beliefs and cultural norms. Although he believed that reciprocal causation does exist in the international

system, he noted that it was not a simultaneous process.

"It is in actuality a successive process in which one phenomenon (e.g., interaction) occurs and then produces another (e.g., similarity of belief)."⁴⁷

As mentioned previously, this study is cross-sectional and thus not capable of directly testing for causal chains. However, an implicit assumption of the analysis is that behavioural patterns of nations can be altered much more quickly than the amount of, and manner of distribution of, means at the disposal of nations. Thus, in a sense, any behavioural patterns discovered are presumed to be the result of not just the accompanying levels of similarity or homogeneity of means, but previously existing (to a limited extent) distributions as well. Given the problems associated with reciprocal causation, no attempt to logically relate similarity and homogeneity, or frequency and type of behaviour, will be made in this study.

Noting these caveats, the following two hypotheses, stated in testable, falsifiable form, will be empirically examined in this study.

- 1) The actor in a dyadic subsystem possessing a high degree of similarity with respect to the share of means at its disposal, relative to the total system, is more likely to be engaged in directed dyadic behaviour of any type than an actor in a dyadic subsystem possessing a low degree of similarity.

2) The actor in a dyadic subsystem possessing a high degree of homogeneity with respect to the manner of allocation or distribution of the means at its disposal, relative to the total system, is more likely to be engaged in peaceful directed dyadic behaviour of any frequency than an actor in a dyadic subsystem possessing a low degree of homogeneity.

It should be noted that these hypotheses are probabilistic in nature and do not imply automaticity in behaviour. To suggest that two nations have similar amounts and manners of allocation of means at their disposal is not to imply automatic interaction, but merely that if they do interact, it will likely be peacefully. Another observation involves the concept of conflict. It is assumed here that conflict does not emerge from an incompatibility of objectives but from an incompatibility of activities related to the acquisition and utilization of means. This is similar to M. Deutsch's definition of conflict: "A conflict exists whenever incompatible activities occur. An action that is incompatible with another action prevents, obstructs, interferes, injures, or in some way makes the latter less likely or less effective."⁴⁸ However, the pursuit of this line of reasoning gives rise to an alternative hypothesis. If two nations in a dyad perceive the same optimal combination of means as necessary to attain and maintain their ends, it is possible that they will come into conflict with one another in simultaneously attempting

to acquire this optimal mix of means. Moreover, it also seems possible that two nations in a dyad with dissimilar means will interact all the more, whether peacefully or conflictually, in order to acquire those means each perceives as important.

In conclusion, it is reasonable to assume many possible combinations of relationships between similarity and frequency of behaviour, and homogeneity and type of behaviour. This study has logically arrived at one such paired combination and will attempt to test it. The result of the test will determine the validity of these hypotheses.

Footnotes (Chapter 3)

1. B.M. Russett, "The Young Science of International Politics," World Politics, Vol. 22, 1969, p. 87.
2. L.R. Beres, The Management of World Power: A Theoretical Analysis, (Denver: University of Denver, 1973), p. 6.
3. See O.R. Young, "Professor Russett: Industrious Tailor to a Naked Emperor," World Politics, Vol. 21, 1969, pp. 486-511.
4. Russett, 1969, op. cit., p. 93.
5. See, for example, S. Hoffmann, "Theory and International Relations," in International Politics and Foreign Policy, ed. by J.N. Rosenau, (New York: Free Press, 1969), pp. 30-40.
6. R.S. Rudner, Philosophy of Social Science, (Englewood Cliffs, N.J.: Prentice-Hall, 1966), p. 66.
7. Beres, 1973, op. cit.
8. Ibid., p. 5.
9. Ibid., p. 6.
10. See, for example: O.R. Young, "The Perils of Odysseus," in Theory and Policy in International Relations, ed. by R. Tanter and R. Ullman, (Princeton, N.J.: Princeton University Press, 1972), pp. 179-203; and R.A. Brody, "The Study of International Politics qua Science," in Contending Approaches to International Politics, ed. by K. Knorr and J.N. Rosenau, (Princeton, N.J.: Princeton University Press, 1969), pp. 110-128.
11. See Hoffmann, 1969, op. cit.
12. Rudner, 1966, op. cit., p. 10.
13. J. Galtung, Theory and Methods of Social Research, (New York: Columbia University Press, 1967), p. 452.
14. For example, whereas contextual theory involves empirical generalizations drawn from available data yielding a limited number of specific hypotheses, deductive theory involves axiomatic statements from which many general hypotheses can be logically derived.

15. For example, Galtung, 1967, op. cit. lists the following 10 dimensions by which to evaluate theory: generality, range, evaluation of the hypotheses, formalization, axiomatization, relation to other theories, predictability, communicability, reproducibility, and fruitfulness.
16. K.J. Holsti, International Politics, (Englewood Cliffs, N.J.: Prentice-Hall, 1972, 2nd ed.), p. 130.
17. See K.W. Deutsch, The Analysis of International Relations, (Englewood Cliffs, N.J.: Prentice-Hall, 1968), pp. 82-86.
18. J. Galtung, "A Structural Theory of Aggression," Journal of Peace Research, Vol. 1, 1964, p. 96.
19. N. Choucri and R.C. North, Nations in Conflict, (San Francisco: W.H. Freeman, 1975). See particularly pp. 23-24.
20. Holsti, 1972, op. cit., p. 131.
21. K.R. Legg and J.F. Morrison, Politics and the International System, (New York: Harper and Row, 1971), p. 141.
22. T. Parsons, The Social System, (New York: Free Press, 1951).
23. See H.D. Lasswell and A. Kaplan, Power and Society, (New Haven: Yale University Press, 1950).
24. P.J. McGowan, borrowing from both Parsons and Deutsch, defines the behaviour of states as goal-seeking, in that states "will act so as to maximize their control over their external and internal societal environments: control being defined as the percentage of goals attained minus the percentage blocked.", in "Foreign Policy as a Social Process," Economic Bulletin of Ghana, Vol. 12, 1968, p. 10.
25. An interesting discussion on whether or not general, universal goals held by all nations are compatible can be found in K. Skjelsbaek, "Value Incompatibilities in the Global System," Journal of Peace Research, Vol. 10, 1973, pp. 341-354. He concludes, "Certain goals are difficult to combine; it is not easy to get 'the best of both worlds'. However, this does not mean that the sum of good and bad is constant. Some solutions are, as a whole, better than others. Although history and empirical evidence may point in the direction of incompatibility, the relationship need not be completely invariable." (p. 353).
26. See H.J. Morgenthau, Politics among Nations, (New York: Knopf, 1967, 4th ed.).

27. See, for example, G.H. Snyder, "The Balance of Power and the Balance of Terror," in Theory and Research on the Causes of War, ed. by D.G. Pruitt and R.C. Snyder, (Englewood Cliffs, N.J.: Prentice-Hall, 1969), pp. 114-126.
28. H. and M. Sprout, Toward a Politics of the Planet Earth, (New York: Van Nostrand, Rineholt, 1971).
29. McGowan, stating that various "media" are used to achieve goals, hypothesizes that, "the media available for effective use, that is, for maximizing the number of goals achieved as compared to goals blocked, are determined by a) the level of economic and technological development of the state, b) its capacities in relation to the states it is in interaction with, c) the level of administrative and organisational capacity of the government structure, and d) the propensities of the authoritative decision-maker(s)... in the order of their determining force." McGowan, 1968, op. cit., p. 17.
30. Choucri and North, 1975, op. cit., p. 16.
31. This is not unlike one of Wright's major assumptions that national capability and value fields determine international behaviours. The Sprouts suggested as well that the environment of states, both internal and external, determines their capabilities, which, in turn, operating through the perceptions of the decision-making elites of the state, determine international behaviours. See H. and M. Sprout, "Environmental Factors in the Study of International Politics," in International Politics and Foreign Policy, 1969, op. cit., pp. 41-56.
32. C.A. McClelland and G.D. Hoggard, "Conflict Patterns in the Interactions among Nations," in International Politics and Foreign Policy, 1969, op. cit., p. 713.
33. R.J. Rummel, "Some Dimensions in the Foreign Behaviour of Nations," Journal of Peace Research, Vol. 3, 1966, pp. 201-223.
34. R.J. Rummel, "Some Empirical Findings on Nations and their Behaviour," World Politics, Vol. 21, 1969, pp. 226-241.
35. McClelland and Hoggard, 1969, op. cit., pp. 711-724.
36. J.N. Rosenau and G.H. Ramsey Jr., "External and Internal Typologies of Foreign Policy Behaviour: Testing the Stability of an Intriguing Set of Findings," in Sage International Yearbook of Foreign Policy Studies, ed. by P.J. McGowan, Vol. 3, 1975, pp. 245-262.

37. Ibid., p. 255.
38. See the discussion in R. Tanter, "Explanation, Prediction and Forecasting in International Politics," in The Analysis of International Politics, ed. by J.N. Rosenau, V. Davis, and M.A. East, (New York: Free Press, 1972), pp. 41-53.
39. Choucri and North, 1975, op. cit., p. 15.
40. B.M. Russett, Community and Contention: Britain and America in the Twentieth Century, (Cambridge: MIT Press, 1963).
41. R.W. Cobb and C. Elder, International Community, (New York: Holt, Rinehart and Winston, 1970), p. 8.
42. Ibid., p. 18.
43. Choucri and North, 1975, op. cit., p. 15.
44. B.M. Russett, International Regions and the International System, (Chicago: Rand McNally, 1967), p. 202.
45. Cobb and Elder, 1970, op. cit., pp. 135-136.
46. G.C. Homans, The Human Group, (New York: Harcourt, Brace, 1950), p. 120.
47. Russett, 1967, op. cit., p. 212.
48. M. Deutsch, The Resolution of Conflict, (New Haven: Yale University Press, 1973), p. 10.

CHAPTER IV

Operationalization and methodology

Given the two hypotheses linking dyadic similarity with frequency of behaviour (regardless of homogeneity), and dyadic homogeneity with type of behaviour (regardless of similarity), a stylized conception representing the deduced relationship is presented in Figure 2 for purposes of clarification.

The circle is used to represent the means available in the system. Means are finite, thus the circle has a finite area. It is then divided into segments, each of which represents a particular dyad. Since there are more than 140 nations in the international system, the total number of dyads exceeds 10,000.¹ For obvious reasons, only a few are shown here. Segments have differing areas, the size of each representing the diverse distribution of means in the system. As indicated by the dotted lines, each segment is divided into two slices, each of which represents one of the two members of a dyad. Since the means available to each nation are not necessarily identical, the slices within each of the segments are of different sizes. In a full-scale model, there would be over 10,000 segments and over 20,000 slices representing all possible paired combinations of states. The dependent variable is the directed dyadic

behaviour within each dyad, depicted by the arrows across each segment.

/ FIGURE 2

STYLIZED DYADIC MODEL

- Note:
- a) Segments bounded by solid lines represent dyads.
 - b) The dotted line divides each segment into two parts, each representing a nation.
 - c) The arrows represent directed dyadic behaviour within each dyad. (i.e., behaviour of nation A to nation B; and behaviour of nation B to nation A).

Now, the degree of equality in the size of the two slices within each segment, weighted by the size of the actor's slice relative to the entire system, will determine the frequency of behaviour of the actor toward the dyadic

target. Frequency of directed dyadic behaviour is hypothesized to be governed not only by the size of the slice (the amount of means available to a nation) relative to the entire system, but also by the degree of equality in size (the similarity of the means available to both nations in the dyad) of the two slices comprising a segment.

Next, each of the segments is shaded to a lighter or darker extent than the others. The shading represents the degree of homogeneity between the two members of a dyad with respect to the manner in which each allocates its available means. Assuming that the darker the shading, the greater the homogeneity, a continuum is implied from most to least homogeneity, and thus from more peaceful to more conflictual behaviour. If the deductive framework were different, other possibilities would exist as expressions of the continuum. For example, light and dark shadings could represent more social welfare oriented states vs more militaristic states, more socialistic vs more capitalistic, etc. However, the continuum expresses only the general degree of homogeneity within a dyad in terms of the manner in which both nations allocate the means at their disposal. If the degree of shading were to be distributed evenly throughout the circle, it would indicate the average manner in which the entire system allocates its means. The pattern of allocation of means for each state can thus be compared to the systemic average.

TABLE 1

Dyad # (Segment)	Nation A (Slice A)	Nation B (Slice B)	Expected Level of Behaviour		Expected Type of Behaviour	
			A → B	B → A	A → B	B → A
1	U.S.	U.K.	High	Less High	Peace- ful	More Peaceful
2	U.S.	Nether- lands	High	Low	Peace- ful	More Peaceful
3	Nether- lands	Israel	Low	Lower	More Peace- ful	Peaceful
4	U.S.	U.S.S.R.	High	High	Confli- ctual	More Conflictual
5	U.S.	Cuba	High	Very Low	Confli- ctual	More Conflictual
6	Cuba	Nether- lands	Very Low	Low	Neutral	More Peaceful
7	Brazil	Egypt	Low	Lower	Neutral	Neutral

- Note: a) These are not concrete predictions but hypothetical expectations, and are by no means precise, as they are intended for clarification only.
- b) The expected results should be compared pair-wise for each dyad.
- c) The figure assumes an average allocational profile for the system using Canada as a typical example. Thus, for purposes of this table, other nations should be compared with Canadian norms regarding allocation of means.
- d) No comparison is made from directed dyad to directed dyad regarding relative levels of activity, nor degree of peaceful behaviour, although the operationalization procedures will do so.
- e) Given this sample of 8 nations, Figure 2 should actually contain 28 segments, or 56 directed dyads, to be complete. For ease of interpretation, only 7 directed dyads are included.

HYPOTHETICAL EXPECTATIONS OF LEVEL AND TYPE OF BEHAVIOUR

Now, the degree of shading of each segment (the homogeneity of the dyad), weighted by the actor's allocational profile relative to the entire system, will determine the type of behaviour of the actor toward the dyadic target.

A final caveat should be noted. There is no specified relationship between the size of a segment or the size of a slice, and difference in shading or average systemic allocational profile. Moreover, there is no specified relationship between segment or slice size and type of behaviour, nor between segment shading and frequency of behaviour. Furthermore, as mentioned previously, a high degree of homogeneity does not guarantee any particular frequency of behaviour, but, if there is interaction, it is expected to be relatively peaceful. Likewise, a high degree of similarity does not guarantee any particular type of behaviour, but the total frequency of all types present will be relatively high. The following table of hypothetical examples represented in the diagram may clarify further any misunderstandings.

Before determining the operational procedures used in the test, the universe of analysis must be defined for the study. A choice must be made regarding the kinds and range of cases to be included. Pairs of nations form the basic unit of analysis. It has been hypothesized that the attributes of such dyads are related to behaviour. Needless to say, to use over 20,000 directed dyads representing all possible combinations of the over-140 nations in the international system

is beyond the material resources of this study. As well, data availability for all combinations would be very poor. Thus, a sample of dyads is necessary, which should be representative of the total possible universe of cases. Moreover, the sample chosen should be large enough that the statistical generalizations made from it are meaningful. A frequently-used rule of thumb is that the number of cases should exceed 20, and that the ratio of the number of cases to the number of variables should exceed 4.

In order to satisfy these conditions, a previously prepared data package was obtained from the Inter-University Consortium for Political Research. The package was the result of previous work done by Rummel in connection with his Dimensionality of Nations project. To justify the sample he chose, Rummel stated:

These dyads represent all the paired relationships between fourteen nations. This sample of nations out of which the dyads were formed was chosen to represent the high, middle, and low values of countries on the major factors emerging from earlier DON factor analyses of 236 variables for 82 nations and 94 variables for 82 nations. Each of the high, middle, and low positions is represented by at least two nations. In order to index the major cultural and regional groupings of nations, Cattell's and Russett's studies were used to identify individual countries that were central to a cultural or regional cluster of nations. The selected list of dyads insures us that the full scope of differences and similarities among nations will be analyzed as they relate to interaction between nations.²

Thus, conditions for both sample size and range are met using Rummel's package. An important note regarding this

sample of 14 nations (or 182 dyads) is that, in any following discussions, whenever the word "system" is used, the author implies the system of 14 nations and not the entire global system. By implication, this selected sample is thus considered as a "universe" in itself; therefore, any discussion regarding the statistical significance of the results would be meaningless. Tests of significance are relevant only when the observed data are based on a randomly selected sample of the total population of cases. Appendix 1 contains a listing of the directed dyads and the corresponding numbers used to identify them in all the tables of the tabulated results.

With perhaps a clearer idea of the nature of, and the linkage between, the independent variables of similarity and homogeneity, and the dependent variable of directed dyadic behaviour, it is necessary to provide operational definitions of these variables. An operational definition of a variable specifies the manner in which such a variable will be measured. Operationalization thus transforms raw information or facts into useable data by means of explicit rules, and this process must be replicable by others.³ The indicators chosen to index or measure the variable so defined must meet certain requirements: They should be valid, reliable, and precise.

Validity is a measurement necessity that requires intersubjective agreement among those to whom the analysis is

directed. In essence, for an indicator to be valid, it must measure what it is supposed to represent. Although there are no absolute criteria for judging the validity of an indicator, Gurr mentioned two possibilities for evaluating an indicator:

One is a theoretically and substantively plausible argument that spells out how and why an indicator represents a significant aspect of a conceptual variable. The other is an accumulation of empirical evidence that an indicator is related to a variety of other measures or indicators in consistent, predicted ways. Evidence of the first sort contributes to face validity. Evidence of the second sort adds to empirical validity, or "construct validity" as it is sometimes called.

Reliability of an indicator is determined by the extent to which "it yields results that are consistent in successive measurements of the same case, and comparable among cases."⁵ In meeting this requirement, the analyst must insure that his indicators are as free from error as possible. Needless to say, the extent to which the results of a study are reliable is determined by the reliability of the data used.

The precision of an indicator is a function of the level of measurement used in collecting data. Generally, three methods are available to scale the measurement of data. Nominal scales merely name variables in categories that are mutually exclusive and exhaustive. Ordinal scales rank categories along specified continuums. Interval scales involve standard measurement units to which appropriate arithmetic op-

erations can be applied. Level of measurement assumes importance if the use of statistical techniques is contemplated for testing predicted relationships. Such techniques require specific levels of measurement, and to apply high order manipulations to low-level scales will render results meaningless.

Validity, reliability, and precision are thus the primary requirements that must be met in operationalizing the variables to be tested. In this analysis, four variables are so operationalized: the dyadic attributes of similarity and homogeneity, and the frequency and type of directed dyadic behaviour.

For the definition of similarity, reference is made to assumptions 15 and 16 of the deductive framework. Similarity is the level of equivalence between the two members of a dyad with respect to the share of means at their disposal. This level of equivalence is weighted by the share of means at the disposal of the actor in the dyad, relative to the system. Means are those resources available, to one extent or another, to all nations, that enable them to carry out actions across their borders in pursuit of their goals.

As a first assumption, it would appear reasonable to suggest that size, natural resources, and level of economic and technological development are important prerequisites for the capacity of states to interact. The size of a nation is indicative of the ability to muster sufficiently large economies of scale to generate border-crossing activities. As well, size could be considered to have psychological effects on those decision-making elites responsible for the initiation

of interstate actions, conditioning their attitudes toward their relative position in the world with respect to influence, status, etc. The nature and level of a nation's resource base represent a potential capacity for interaction. Each nation needs a minimum level of resources such as food and energy to sustain itself. The fewer such resources it possesses, the greater the resultant need to increase the resource base, and thus the greater the efforts devoted domestically to that end. On the other hand, with a large domestic resource base, relative to their needs, states are less constrained domestically, and are capable of devoting more attention to externalized activities. The level of economic and technological development of a nation, or its level of modernization, affects its organizational and bureaucratic capacity to engage in external behaviour. The greater the level of economic and technological development, the greater the ability of a nation to control its environment, including in part its external environment.

These indicators are assumed to be conceptually distinct, although they may be empirically related to a certain extent. The greater the size of a country, the greater the likelihood of a larger resource base. The larger a resource base, the greater the development possibilities. Nevertheless, there is considerable support in the literature for choosing such indicators to represent the means available to a nation for purposes of interstate interaction.

Rummel⁶, Haas⁷, McGowan⁸, East⁹, Salmore and Hermann¹⁰, are among those scholars who have attempted to empirically link attributes to foreign policy behaviour. However, this study has assumed that means, specifically, are linked to frequency of behaviour. Thus, many of the indicators used by others to measure the attributes of nations are not considered acceptable: such as Rosenau's notion of political accountability, Sawyer's dimension of political orientation, Rummel's dimension of Catholic culture, etc. Nevertheless, size, modernity, and resources have consistently been both conceptually and empirically related to interstate behaviour.

The search for indicators of means was governed by a number of requirements, as mentioned previously. Since certain statistical techniques were utilized in testing the hypotheses, only interval level indicators were selected. In order to ensure completeness in coverage, the choice of indicators was restricted to those for which comparable information for all 14 nations was available. All values were taken for 1965, the year chosen for analysis. Furthermore, absolute, and not relative or combined, measures were used to conform with previously discussed theoretical requirements. In other words, no ratio measurements such as GNP/capita were selected, thus ensuring that the concept of total domestic means, and not distributed means, remained intact.

The following indicators were thus chosen to represent the means available to nations:

1. size of the country in terms of area
2. total population
3. total gross national product (or the related measure of net material product for Cuba, Poland, and the U.S.S.R.)
4. share of the world's total scientific authorship
5. total energy production
6. total grain production

Table 2 displays the values for each nation. All indicators represent 1965 totals (or closest year). Indicators 1 and 2 represent size, 3 and 4 level of economic and technological development or modernity, and 5 and 6 resource base.

In order to tap the concept of similarity of means, an index was constructed using these indicators. The procedure below was used to compute the similarity coefficient for each of the 182 directed dyads.

First, the following calculations were made for each of the six indicators:

- a) dyadic subtotals of available means
- b) for each nation in a dyad, its share of the dyadic subtotal (as a ratio)
- c) for each dyad, the absolute value of the difference in shares between the two nations (ratio of one nation's dyadic share minus ratio of the other nation's dyadic share)
- d) for each dyad, 1 minus the absolute value of the above difference (termed the similarity multiplicand)
- e) for each nation, its share of the system total (actor multiplier)

TABLE 2

NATION	SIZE ^a	POPULATION ^b	GNP ^c	ENERGY ^d PRODUCTION	GRAIN ^e PRODUCTION	SCIENTIFIC ^f AUTHORSHIP
Brazil	8512.0	82.2	22.0	11.70	8165	.160
Burma	678.0	24.7	1.8	.77	8127	.003
China	9561.0	700.0	76.0	336.08	115000	.029
Cuba	114.5	7.6	3.0	.06	181	.004
Egypt	1000.0	29.6	4.7	8.67	3500	.210
India	3183.6	486.7	49.2	73.83	58273	2.260
Indonesia	1491.6	105.3	10.5	34.71	13245	.008
Israel	20.7	2.6	3.6	.36	150	.860
Jordan	97.7	2.0	.5	.01	278	.001
Netherlands	33.6	12.3	19.1	16.94	691	1.080
Poland	312.5	31.5	30.8	128.04	3422	.950
U.S.S.R.	22402.2	230.6	313.0	928.88	60269	8.200
U.K.	244.0	54.6	99.3	193.42	4171	10.170
U.S.A.	9363.4	194.6	695.5	1663.26	39265	41.700
SUM	57014.8	1964.3	1329.0	3396.73	314737	65.635
MEAN	4072.5	140.3	94.9	242.62	22481	4.688

NOTES: a) 1000's of (Km.)², (1965) from Taylor and Hudson (1972), p.299, Table 5.2.

b) 1,000,000's (1965) Ibid., p.295, Table 5.1.

c) 1,000,000's of \$US (1965) Ibid., p.306, Table 5.4.

d) 1,000,000's of metric tons coal equivalent (1965) from U.N. Statistical Yearbook 1967, U.N. Statistical Office, New York, 1968.

e) 1000's of metric tons (wheat & rice), (1965) Ibid.

f) proportion in % of all authors of scientific papers in the world, (average of 1967-8-9) from Taylor and Hudson (1972), p.322, Table 5.6.

SIMILARITY INDEX INDICATOR VALUES FOR 14 SELECTED NATIONS, 1965

- f) for each directed dyad, the similarity multiplicand times the actor multiplier

$$\text{The formula used is: } \left[1 - \text{ABS} \left[\frac{X1 - X2}{\text{DYAD TOTAL}} \right] \right] * \left[\frac{X1}{\text{SYSTEM TOTAL}} \right]$$

where X1 = nation 1's score on the indicator

X2 = nation 2's score on the indicator

DYAD TOTAL = (X1 + X2)

SYSTEM TOTAL = (X1 + X2 + ... + X13 + X14)

ABS = Absolute Value

There were thus 182 scores obtained for each indicator, which correspond to a weighted difference between the two nations in a dyad of the means designated by that indicator. Then, for each directed dyad, its scores on all 6 indicators were summed and divided by 6 to obtain an average value. This average value is used as a measure of the similarity in each directed dyad.

The primary and obvious reason for constructing an index is to generate a single, inclusive measure that, to a certain extent, is exhaustive in its capacity to represent the concept "means". Immediately, problems arise with respect to the additivity of the various indicators chosen to represent "means".¹¹ Needless to say, dollars, people, and square miles can not directly be added in any meaningful sense. However, in constructing the index, the indicators were transformed into dimensionless levels of differences. These values for each indicator, all representing the same concept of similarity of means, are thus additive. Moreover, an implicit assumption was made regarding the linear additivity of these difference values.

Although weighted in each case by the actor's means available, they were not weighted in terms of salience with respect to each other. In other words, the underlying assumption is made that all 6 indicators equally affect the nation's ability to engage in international behaviour.

Given this procedure to calculate the similarity coefficient, it should be noted that the score for the least similar directed dyad possible is 0, and for the most similar directed possible, 1. This interval scale continuum is hypothesized to be directly related to the frequency of directed dyadic behaviour. Table 3 displays the similarity coefficient values for all 182 directed dyads.

Viewing the results in Table 3, although they are listed in terms of a continuous scale, it would be unwise to assess them individually for each directed dyad. Thus, for example, it would be difficult to state with certainty that the similarity of the directed dyad, Indonesia-Cuba is half that of Netherlands-Poland. Nevertheless, the results do seem to be, on the whole, intuitively reasonable. Jordan, one of the smallest and poorest nations in the sample, is least similar in those dyads associated with China, the Soviet Union, and the U.S. Conversely, the most similar directed dyads involve the U.S. and the U.S.S.R., China and the Soviet Union, and the U.S. and China. Keeping in mind the fact that both similarity in means and actor/system shares are included in the coefficient, note that, for example, the directed dyad of

TABLE 3

Directed Dyad #	Similarity Coefficient	Directed Dyad #	Similarity Coefficient	Directed Dyad #	Similarity Coefficient	Directed Dyad #	Similarity Coefficient
1	1171	46	86	91	1112	136	969
2	2688	47	76	92	83	137	698
3	272	48	79	93	36	138	381
4	1333	49	51	94	19	139	116
5	1854	50	5	95	64	140	897
6	1894	51	40	96	129	141	358
7	164	52	6	97	127	142	1164
8	131	53	409	98	29	143	243
9	582	54	617	99	38	144	6105
10	1069	55	109	100	223	145	1576
11	1879	56	229	101	222	146	11053
12	1096	57	218	102	43	147	288
13	2951	58	479	103	41	148	1660
14	559	59	143	104	10	149	8663
15	99	60	123	105	3	150	3782
16	193	61	297	106	14	151	560
17	623	62	606	107	1(.8)	152	133
18	197	63	108	108	47	153	1390
19	538	64	472	109	11	154	3233
20	85	65	155	110	2	155	6624
21	120	66	3015	111	5	156	1457
22	230	67	1534	112	37	157	150
23	567	68	6558	113	28	158	530
24	155	69	284	114	18	159	1874
25	528	70	1549	115	1(.7)	160	253
26	222	71	3659	116	19	161	854
27	5230	72	476	117	1(1.1)	162	2422
28	1632	73	132	118	394	163	973
29	288	74	1147	119	126	164	562
30	1567	75	2090	120	123	165	114
31	11707	76	6390	121	167	166	1301
32	4109	77	2195	122	314	167	2388
33	1621	78	5487	123	349	168	3440
34	133	79	1620	124	254	169	1771
35	839	80	1192	125	380	170	5033
36	2500	81	561	126	68	171	1509
37	10052	82	262	127	532	172	8962
38	3456	83	1185	128	1058	173	287
39	9192	84	1011	129	194	174	1612
40	213	85	141	130	42	175	6941
41	70	86	128	131	758	176	3538
42	5	87	481	132	452	177	593
43	64	88	990	133	623	178	132
44	9	89	888	134	242	179	1453
45	31	90	1146	135	751	180	3348
						181	19509
						182	9294

SIMILARITY COEFFICIENTS FOR 182 DIRECTED DYADS, 1965

NOTE: EACH VALUE IS MULTIPLIED BY 10^5 FOR CLARITY.
 Least similar = .7, most similar = 19509, Mean = 1516,
 Standard Deviation = 2767

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Burma-Indonesia (538) has a much higher similarity coefficient than that of Burma-India (197). Not only are Burma's available means more similar to those of Indonesia than those of India, but also, the coefficients for the reciprocal directed dyads of Indonesia-Burma (1192) and India-Burma (1534) reflect the much greater amount of means available to Indonesia and India.

To continue, the variable, homogeneity, is defined with reference to assumptions 20 and 23 of the deductive framework. Homogeneity is the level of the congruence between the two members of a dyad with respect to the manner in which they allocate or distribute the means at their disposal. This level of congruence is weighted by the difference between the manner in which the actor allocates his means and the average manner in which the system allocates its means.

For this concept, distributional rather than absolute indicators are required. Previous studies, including those mentioned earlier, have not made the consistent distinctions between distributive and absolute indicators necessary for this analysis. Certainly, there appear to be no necessary links between these two types of indicators. Nations with a high GNP can have either a high (U.S.) or low (Japan) relative GNP/capita. Nations with a high level of energy resources may not consume them in large quantities but rather export them.

As mentioned previously, indicators for allocational profiles could be chosen to represent various conceptualized continuums. However, since the deductive framework does not attempt to link types of allocation to types of behaviour, only general representative indicators were selected. These indicators, meeting the requirements of availability, comparability, and interval measurement, are somewhat more difficult to validate. Nevertheless, they represent typical governmental priorities regarding defence, nature of the economy, health and literacy of the population, internal security, etc. Although it could be argued that governments may not control all their resources all the time in a rational manner designed to pursue their goals, this assumption is nevertheless implicit in the analysis. Thus, the values of the indicators used to represent allocational profile imply control by government over the means available to them.

The following indicators were chosen to represent the manner in which available means were distributed by the 14 nations in 1965:

1. ratio of defence expenditures to GNP
2. ratio of internal security forces to population
3. ratio of energy consumption to population
4. ratio of urbanization to population
5. ratio of value of agricultural output to GDP
6. ratio of value of industrial output to GDP

7. ratio of doctors to population
8. ratio of post-secondary students to population
9. daily caloric intake per person

Table 4 displays the values for each nation. Indicators 1 and 2 represent national concern for security; 3 and 4 represent concern for modernization; 5 and 6 represent concern for nature of economic development; 7, 8, and 9 represent concern for the social welfare of the population.

In order to tap the concept of homogeneity of allocational profile, an index was again constructed using these indicators. The procedure below was used to compute the homogeneity coefficient for each of the 182 directed dyads.

First, the following calculations were made for each of the 9 indicators:

- a) dyadic average of distribution manner
- b) for each nation in a dyad, the ratio of its manner of distribution to that of the dyad as a whole
- c) for each dyad, the absolute value of the difference in nation/dyad distribution ratios between the two nations. (homogeneity multiplicand)
- d) for each nation, the absolute value of the difference between its manner of distribution and that of the system as a whole (actor multiplier)
- e) for each directed dyad, the homogeneity multiplicand times the actor multiplier

The formula used is:
$$\left[\text{ABS} \left[\frac{X1 - X2}{\text{DYAD MEAN}} \right] \right] * \text{ABS}(X1 - \text{SYSTEM MEAN})$$

where $X1$ = nation 1's score on the indicator

$X2$ = nation 2's score on the indicator

$\text{DYAD MEAN} = (X1 + X2) / 2$

TABLE 4

Nation	Def/ ^a GNP	Int.Sec/ ^b Pop	En.Cons/ ^c CAP	Urban ^d	Agri/ ^e GDP	Ind/ ^f GDP	Doctors/ ^g Pop	Stud/ ^h Pop	Calories/ ⁱ Cap
Brazil	2.9	2.6	347	20.6	29	28	424	1890	2860
Burma	6.3	1.0	47	5.4	33	16	84	1060	2010
China	7.9	1.6	461	10.6	40	19	101	1220	2040
Cuba	7.1	1.5	950	21.5	35	20	877	4000	2500
Egypt	8.3	6.6	301	28.0	30	21	441	5980	2810
India	4.2	2.1	172	9.0	51	18	207	2840	1810
Indo- nesia	9.6	2.2	111	11.1	50	13	34	1800	1980
Israel	12.2	5.4	2239	34.2	9	35	2439	14000	2850
Jordan	13.0	5.1	291	15.0	25	10	245	1620	2390
Nether- lands	4.0	2.3	3271	31.3	8	41	1163	12090	3190
Poland	5.5	2.4	3504	21.4	23	51	1250	8000	3350
U.S.S.R.	9.0	2.8	3611	27.5	22	52	2083	16740	3040
U.K.	5.9	2.7	5151	46.1	3	42	866	5790	3250
U.S.A.	7.6	3.5	9201	32.3	4	34	1493	28400	3140
SUM	103.5	41.8	29657	314.0	362	399	11707	105430	37220
MEAN	7.4	3.0	2118	22.4	26	29	836	7531	2659

Note: a) Defense expenditures as % of GNP (1965) from Taylor and Hudson (1972), p.34, Table 2.3.

b) Internal security forces per 1000 working-age population (1965) Ibid., p.42, Table 2.5.

c) Energy consumption per capita per year in kgs. coal equivalent (1965) Ibid., p.326, Table 5.7.

d) % of population in cities over 100,000 (1965) Ibid., p.219, Table 4.1.

e) % share of agricultural output of GDP (1965) Ibid., p.338, Table 5.11.

f) % share of industrial output of GDP (1965) Ibid., p.338, Table 5.11.

g) Physicians per 1,000,000 population (1965) Ibid., p.259, Table 4.12.

h) Student enrollment in post-secondary institutions per 1,000,000 population (1965) Ibid., p.229, Table 4.4.

i) calories consumed per capita per day (1965) Ibid., p.256, Table 4.11.

HOMOGENEITY INDEX INDICATOR VALUES FOR 14 SELECTED NATIONS, 1965

$$\text{SYSTEM MEAN} = (X_1 + X_2 + \dots + X_{13} + X_{14})/14$$

ABS = Absolute Value

There were thus 182 scores obtained for each indicator, which correspond to a weighted difference between the two nations in a dyad of the manner in which they allocate the means designated by that indicator. Then, for each directed dyad, its scores on all 9 indicators were summed and divided by 9 to obtain an average value. This average value is used as a measure of the homogeneity in each directed dyad.

Again, as for the similarity index, the same assumptions regarding the linear additivity of the 9 indicators were made. Thus, each of the 9 indicators was transformed into a dimensionless dyadic measure, of equal salience with respect to the others, and averaged to provide a single inclusive measure of homogeneity.

Given this procedure to calculate the homogeneity coefficient, it should be noted that the score for the least homogeneous directed dyad possible is infinity, and for the most homogeneous directed dyad possible, 0. This interval scale continuum is hypothesized to be directly related to the type of directed dyadic behaviour. Table 5 displays the values of the homogeneity coefficient for all 182 directed dyads.

As for the similarity coefficient results, the reader is again warned not to make direct arithmetic comparisons between the homogeneity coefficients of individual directed dyads. The results are more suited to aggregated comparisons than a

TABLE 5

Directed Dyad #	Homogeneity Coefficient	Directed Dyad #	Homogeneity Coefficient	Directed Dyad #	Homogeneity Coefficient	Directed Dyad #	Homogeneity Coefficient
1	722	46	549	91	1769	136	443
2	390	47	477	92	1370	137	485
3	667	48	545	93	1606	138	140
4	682	49	418	94	1564	139	421
5	427	50	642	95	984	140	40
6	320	51	329	96	848	141	72
7	1309	52	811	97	1291	142	95
8	160	53	211	98	1493	143	211
9	1278	54	603	99	1459	144	2093
10	1146	55	374	100	240	145	2403
11	1386	56	310	101	519	146	2296
12	1016	57	273	102	166	147	1574
13	1516	58	454	103	782	148	1436
14	895	59	509	104	594	149	2006
15	494	60	234	105	180	150	2251
16	1409	61	496	106	640	151	286
17	1482	62	436	107	338	152	2200
18	999	63	565	108	850	153	428
19	633	64	398	109	805	154	802
20	1863	65	654	110	485	155	1172
21	730	66	449	111	357	156	722
22	1836	67	794	112	1469	157	803
23	1736	68	674	113	1411	158	975
24	1903	69	596	114	1317	159	860
25	1622	70	584	115	1542	160	559
26	1976	71	437	116	1189	161	624
27	479	72	1228	117	1659	162	813
28	416	73	438	118	990	163	896
29	1019	74	1191	119	1194	164	442
30	1131	75	1049	120	1112	165	852
31	793	76	1301	121	679	166	292
32	579	77	908	122	599	167	200
33	1597	78	1433	123	947	168	319
34	362	79	444	124	1092	169	452
35	1594	80	589	125	156	170	5609
36	1489	81	610	126	1057	171	6022
37	1675	82	1021	127	223	172	5835
38	1388	83	1072	128	202	173	4827
39	1796	84	517	129	428	174	4588
40	408	85	1595	130	542	175	5456
41	703	86	418	131	376	176	5791
42	519	87	1571	132	501	177	2575
43	296	88	1437	133	431	178	5739
44	325	89	1655	134	252	179	2637
45	516	90	1306	135	334	180	3325
						181	1914
						182	3553

HOMOGENEITY COEFFICIENTS FOR 182 DIRECTED DYADS, 1965

Least Homogeneous = 6022, Most Homogeneous = 40

Mean = 1120, Standard Deviation = 1127

case-by-case examination. Thus, it would be unsound to infer that the directed dyad of the Soviet Union-India is twice as homogeneous as that of Burma-India. Nonetheless, many of the results appear to conform to reality: It comes as no surprise that many of the dyads associated with the U.S. lack homogeneity, since the U.S. is the most modern, industrialized nation in the world, while more than half the nations in the sample are underdeveloped, agrarian-based members of the Third World. On the other hand, Poland, being a satellite of the Soviet Union, has an allocational profile similar to that of the U.S.S.R., as reflected in the homogeneity coefficient (72). Homogeneity in dispersion of available means is weighted for each actor by comparison of its allocational profile to the system average. Thus, note that while the Cuba-Soviet Union (642) and Cuba-U.S. (811) coefficients reflect the greater homogeneity between Cuba and the Soviet Union than between Cuba and the U.S., the reciprocal coefficients for U.S.S.R.-Cuba (1574) and U.S.-Cuba (4827), although maintaining this pattern, also reflect the fact that Cuba conforms more closely to the systemic allocational profile average, which is somewhat biased toward a Third World representation.

To assess the assumption made that the indicators selected to represent the similarity and homogeneity coefficients, and hence that the two coefficients themselves, were not related, the reader is referred to Figure 3.

This scattergram plots the values of the two coefficients

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for each directed dyad. There appears to be no apparent relationship, the scatterpoints being basically randomly distributed, although dissimilarity seems much more prevalent than lack of homogeneity. Moreover, as indicated by the coefficient of determination (Pearson product-moment r^2), less than 10% of the variation in similarity is accounted for by variation in homogeneity (or vice versa). These results support the assumption that the two coefficients are basically independent. Furthermore, this mutual exclusivity eases the task of relating the two separate independent variables to the two separate aspects of the dependent variable, frequency and type of directed dyadic behaviour.

The final variable that requires operationalization is directed dyadic behaviour. As mentioned previously, Rummel's data package was used for the measurement of behaviour. The information was presented in the directed dyadic format suitable for this analysis. 55 indicators are included which "were chosen to mark or index the dimensions of dyadic behaviour found in a variety of previous quantitative analyses, including Dimensions of Nations."¹² The reader may refer to the Research Report¹³ included with the data package for a more complete justification of the validity and reliability of the information.

Since the behaviour in question is externally directed national behaviour, the following frequently-used definition of foreign policy behaviour is given:

... those discrete official actions of the authoritative decision makers of a nation's government, or their agents, which are intended by the decision makers to influence the behaviour of international actors external to their own polity.¹⁴

This definition is similar to that used by McClelland in the WEIS project.¹⁵ The CREON project¹⁶ defines external behaviour "as a discrete action resulting from a decision by the political authorities of a state who have the power to commit the national government."¹⁷

One of the greatest difficulties in assessing interstate behaviour involves the classification or typological differentiation of behaviour. This problem was first addressed by Rummel¹⁸, and in a different manner by McClelland.¹⁹ Later, studies were made by Hermann²⁰, Azar²¹, and Legault.²² In a recent account by Kegley, Salmore, and Rosen, they conclude that, although convergence is occurring in the measurement of interstate behaviour, "researchers should be cautious about borrowing measures from others and applying them directly to their peculiar research designs."²³

For this reason, and since Rummel included some indicators in his data which did not appear to be useful for this particular study, the following steps were taken:

1. only behaviour that could be considered official was included
2. only those measures that were of interval scale were used
3. with the above caveats in mind, indicators were chosen to represent a wide range of affective behaviour - from peaceful, through neutral or participatory, to conflictual.

Appendix 2 lists the behavioural indicators selected.

Since there is a great deal of uncertainty regarding the validity of having one indicator represent each type of behaviour, multiple indicators were selected. However, it is necessary to collapse these indicators into useful categories which can more validly represent behavioural types. As one study noted:

Since the description of behaviour must precede the explanation of it, it follows that only after the basic types of foreign policy behaviour have been isolated and identified by empirical procedures can positive theory construction proceed.²⁵

The technique used to reduce the behavioural measures of frequency and type into a more manageable, consistent, reliable, and valid index is factor analysis. Although only a brief introduction is provided here, the reader may refer to more detailed descriptions.²⁵

Factor analysis arose out of attempts by psychologists to identify an underlying dimension of intelligence among numerous test cases possessing diverse characteristics. The technique now can be applied "to explore a content area, structure a domain, map unknown concepts, classify or reduce data, illuminate causal nexus, screen or transform data, define interdependencies, test hypotheses, formulate theories, control variables, or make inferences."²⁶ However, this study will use factor analysis only as a device to construct indices of types of behaviour varying in frequency

or amount from one directed dyad to another.

The variables to be factor analyzed are first correlated with each other, using, in general, the Pearson product-moment correlation. Given this matrix of correlation coefficients of the set of variables, factor analysis is then applied to determine "whether some underlying pattern of relationships exists such that the data may be 'rearranged' or 'reduced' to a smaller set of factors or components...".²⁷

At this stage, one of two choices must be made. If the analyst desires to make inferences about the structure of the variables and their source of variation, in order to define patterns of common variation among the set of variables, he will use classical or common factor analysis. A common factor solution searches for the minimum number of factors necessary to account for the observed intercorrelations. On the other hand, if the analyst wishes to obtain exact mathematical transformations of the original data as reflected in defined factors, in order to account for all the variation in the set of variables, he will select principal component analysis. A component solution searches for those factors that account for most of the variation in the correlation matrix. Factor analysis assumes that although there may be common variation between variables, a certain amount of the variance in each variable is unique to that variable alone. Thus, depending on whether the researcher wishes to account

only for the common variance among the variables, or for the total variance, including both common and unique variance, he selects common or component solutions, respectively.²⁸ Since this analysis is used only for the descriptive purpose of constructing behavioural indices, and not for "source" or causal factors which underlie common variation in behaviour, the principal components solution was employed.

Put simply, the process extracts components or factors successively accounting for the greatest amount of residual variance remaining in the correlation matrix. Thus, the first extracted factor is the single best summary of all linear relationships in the data. The second factor summarizes all the variance remaining in the data not accounted for by the first factor, and so on, until all the variance in the data is accounted for. Since each successive factor does not share any of the variance accounted for by the preceding factors, all the factors are independent of, uncorrelated with, or orthogonal to each other.

From this initial solution, certain useful information may be extracted. Each variable will have a loading on each factor which corresponds to a correlation coefficient, where the square of the value of the loading represents the variation the variable has in common with the factor. The sum of such squared loadings for any variable, called

the communality of the variable, is thus a measure of the proportion of variance in the variable accounted for by all the factors taken together. The closer this value approaches unity, the greater the utility of that particular variable in defining the extracted factors.

Associated with each factor is an eigenvalue which, in fact, is the solution to the characteristic equation defining that factor. The eigenvalue is the sum of the squared loadings of all the variables comprising that factor. Since all variables have been initially normalized in computing the correlation matrix, the total variance in the data equals the number of variables used. Thus, the proportion of total variance accounted for by each factor is its eigenvalue divided by the number of variables in the analysis. As such, this proportion is a measure of the factor's comprehensiveness and strength.²⁹

Because of the manner in which these factors are extracted, this solution is not unique, having defined only general dimensions in the variable set. The factors can be rotated to provide clearer, more distinct clusters of variables. The numerous methods of rotation can best be divided into two categories: orthogonal or oblique. The first maintains the orthogonality of the factors, whereas the second allows the factors to be intercorrelated. While this latter method is perhaps more empirically realistic,

the former is more suitable for the calculation of factor scores on independent factor dimensions. Since this study uses factor analysis as a data reduction technique, orthogonal rotation is used.³⁰ In rotation, a "simple structure" is obtained whereby, in general, each variable loads highly on only one factor; thus allowing greater ease of interpretation of the factors. Loadings are high if they approach + or - 1, similar to a correlation coefficient. A loading of 0 indicates no co-variance between a variable and factor. Although the communalities of the variables, as well as the total variance of all the factors, remains the same after orthogonal rotation, the total variance of each factor changes somewhat, generally in the direction of a more balanced accounting of each factor. A rule normally followed is to rotate only those factors whose eigenvalue exceeds unity. Since the variance of any single normalized variable is unity, it is reasonable to expect that useful factors should have at least that minimum amount of variance as well.

To return to the discussion of the behavioural indicators, factor analysis was used to empirically define a reduced set of dimensions of behaviour out of the 21 indicators chosen to represent diverse behavioural types. Mindful of the previously mentioned expected dimensions of behaviour, the reader is referred to Table 6 for the results of the factor analysis on the 1965 behavioural data.

02/26/76

XEROX VERSION 6.00

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES

FILE RUMDD (CREATION DATE: 09/16/75) DIMENSIONALITY OF RATIOS -- CYADIC DATA

SUBFILE Y05

TABLE 6

VARIABLE	EST COMMUNALITY	COMMUNALITY	FACTOR	EIGENVALUE	PCT OF VAR	CUM PCT
VAR003	1.00000	.74320	1	5.03043	24.0	24.0
VAR004	1.00000	.56907	2	4.28824	20.4	44.4
VAR005	1.00000	.59445	3	2.52852	12.0	56.4
VAR006	1.00000	.65529	4	1.90715	9.1	65.5
VAR015	1.00000	.65970	5	1.57262	7.5	73.0
VAR018	1.00000	.92060	6	1.15556	5.6	78.5
VAR019	1.00000	.90246	7	.86649	4.1	82.7
VAR020	1.00000	.87817	8	.78273	3.6	85.3
VAR022	1.00000	.64269	9	.54703	2.8	89.1
VAR023	1.00000	.80095	10	.50750	2.4	91.4
VAR024	1.00000	.91902	11	.42384	2.0	93.6
VAR025	1.00000	.93316	12	.34569	1.8	95.4
VAR026	1.00000	.89874	13	.30429	1.7	97.1
VAR027	1.00000	.58314	14	.27611	1.3	98.5
VAR050	1.00000	.84539	15	.14374	.7	99.1
VAR051	1.00000	.87147	16	.09504	.5	99.6
VAR052	1.00000	.89532	17	.05054	.2	99.8
VAR053	1.00000	.89137	18	.02747	.1	100.0
VAR054	1.00000	.84577	19	.00368	.0	100.0
VAR055	1.00000	.92676	20	.06239	.3	100.0
VAR059	1.00000	.51612	21	.00062	.0	100.0

RESULTS OF FACTOR ANALYSIS OF 21 SELECTED BEHAVIOURAL INDICATORS, 1965

Note: Refer to Appendix 2 for definitions of the variables.

TABLE 6 (cont'd)

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES - XEROX VERSION 6.00

FILE: D00000 (CORRELATION DATE: 09/16/75) DIMENSIONALITY OF NATIONS 2- DYADIC DATA
NO FILE: YAS

FACTOR MATRIX USING PRINCIPAL FACTOR, NO ITERATIONS

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
VAR003	.36950	-.11958	-.20440	.70385	.14707	-.17815
VAR004	.28543	-.11651	-.10555	.34760	.19498	-.35002
VAR005	.03272	.02284	-.22428	.69170	.24748	.02924
VAR006	.55447	-.27055	-.04087	.34912	-.36970	.00710
VAR015	.08328	.36208	.70823	.12130	.05473	-.04458
VAR018	-.01536	.40058	.05092	.18724	.00950	-.02383
VAR019	-.02153	.39739	.04163	.18781	.00530	-.02049
VAR020	.46072	.66179	-.22926	.05187	.07674	.39812
VAR022	.40695	.57499	-.32305	-.11508	-.09396	-.14155
VAR023	.31951	.41049	-.26148	-.02037	.09241	.67222
VAR024	.43587	.72102	-.23113	-.20306	-.12802	-.31325
VAR025	.44512	.82171	-.09174	-.05788	-.07751	-.20374
VAR026	.43337	.78367	-.14759	-.10661	-.06105	-.26083
VAR027	.15657	.45030	.11587	.44724	-.03217	.37599
VAR050	.65091	-.47974	.06714	.03050	-.41058	.08411
VAR051	.68235	-.31059	.20148	-.37782	.34511	.08344
VAR052	.67556	-.43595	.03833	.20492	-.45043	-.02805
VAR053	.74170	-.21687	.17812	-.28203	.39096	-.00595
VAR054	.62855	-.30817	.20582	-.12322	.05611	.06007
VAR055	.88398	-.34068	.13968	-.08034	.04681	-.03357
VAR059	.10579	-.07506	-.06110	.03043	.70325	-.00824

LOADINGS ON 6 FACTORS BEFORE ROTATION

Note: Previous page lists communalities of variables, eigen-values, and % total variation of factors.

TABLE 6 (cont'd)

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES- XEROX VERSION 6.00

FILE R0000 (CREATION DATE: 07/10/75) DIMENSIONALITY OF MATRICES -- DYADIC DATA
 YES

VARIMAX ROTATED FACTOR MATRIX

	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
VAR003	.04491	.03177	-.03138	.32084	.79612	.04921
VAR004	.10120	.22151	-.02019	.00093	.60705	-.16874
VAR005	.07779	.17437	-.01805	.01778	.71217	.22020
VAR006	.02526	.10689	-.03414	<u>.75092</u>	.29808	.06747
VAR015	.10076	.07799	<u>.39959</u>	-.03319	-.03835	.01602
VAR018	.03857	-.01803	<u>.94997</u>	-.05068	-.06241	.01804
VAR019	.03547	-.02549	<u>.94530</u>	-.05028	-.06340	.02009
VAR020	<u>.57754</u>	.10702	.03706	-.01816	.07186	<u>.72541</u>
VAR022	<u>.77264</u>	.03356	-.10359	.05946	.02389	.17813
VAR023	.24015	.12710	-.11552	-.03459	-.05749	<u>.84218</u>
VAR024	<u>.95556</u>	.04022	.01515	.00598	.03890	.05036
VAR025	<u>.92296</u>	.02056	.20995	-.00705	.03395	.19305
VAR026	<u>.92397</u>	.04303	.16302	-.02915	.02388	.12320
VAR027	.14833	-.17547	.36634	.09773	.21767	<u>.90230</u>
VAR050	.07825	.37446	-.10164	<u>.82802</u>	.05561	-.00124
VAR051	-.00855	<u>.91901</u>	-.01449	.15930	.07267	.02090
VAR052	-.01394	.27185	-.00124	<u>.82667</u>	.10596	.04703
VAR053	.11175	<u>.92394</u>	.02855	.14187	.06339	.01561
VAR054	.05661	<u>.76047</u>	.05512	<u>.82500</u>	.03025	.05510
VAR055	.10320	<u>.77545</u>	.00007	<u>.94099</u>	.11252	.01015
VAR059	-.09348	<u>.83045</u>	-.06041	<u>.91081</u>	.30298	.05507

LOADINGS ON 6 FACTORS AFTER VARIMAX ROTATION

As mentioned, the factor analysis was done using the principal components solution, and those initially extracted factors whose eigenvalue exceeded unity were rotated orthogonally using Kaiser's varimax criterion.

The first six factors extracted in the unrotated solution account for almost 80% of the variation in the data. As well, all the indicators included in the analysis are well represented by the 6 factors as evidenced by their communalities. (The reader is referred to Appendix 2 for the definition of each indicator.) For most of the indicators, the factors account for well over 80% of their variation. Even the lowest variable, diplomatic representation, had more than 50% of its variation accounted for by the factors. Thus, an initial conclusion is that the selection of indicators was reasonably representative of the major types of behaviour uncovered.

Observing the unrotated solution, it can be seen that over half the variables load relatively highly on the first factor. This is to be expected since this factor is extracted so as to tap the greatest amount of variation in all variables. Moreover, as seen in both the loadings and eigenvalues, each successive factor accounts for rapidly decreasing amounts of the total variance, since each accounts for only the residual variance unaccounted for by the preceding factors.

Turning to the more useful, interpretable rotated solution, it becomes obvious that the clustering of variables is more distinct. Each factor now describes a particular dimension or type of behaviour around which the most heavily loaded indicators are grouped. Depending on the type of behaviour which the researcher feels each indicator represents, it is possible to label each factor with the name of a type of behaviour. This labelling process is certainly not empirical, and requires both good judgement and a good imagination on the part of the analyst. Consequently, noting those variables which load highest on each factor, the following names are suggested:

- Factor 1 - using variables 22,24,25,26 - verbal conflict
- Factor 2 - using variables 51,53,54,55,59 - co-operative coexistence
- Factor 3 - using variables 15,18,19 - armed conflict
- Factor 4 - using variables 6,50,52 - coexistence (intended to tap neutral affective behaviour, this dimension taps formal international participation as well)
- Factor 5 - using variables 3,4,5 - peaceful co-operation
- Factor 6 - using variables 20,23,27 - economic conflict

Certainly, these names are only arbitrary, but this author feels they are reasonably defensible on the grounds of common sense.³¹

Given that the loadings are more distinctly clustered, the amount of total variance accounted for by each factor also changes somewhat. (F1-17.6%, F2-16.4%, F3-12.9%, F4-14.1%, F5-9.2%, F6-8.4%) As one source noted, however:

The importance of a factor as indicated by variance accounted for is of no particular interest in a terminal solution (rotated one), because the importance of a factor in a terminal solution often reflects only the number of variables for a given factor included in the data relative to the total number of variables.³²

Some qualifications are in order regarding some of the variables. Variable 20 loads relatively highly on both Factors 1 and 6. Given Rummel's assertion that it represents "acts or actions", it was used to define the physical aspect of economic conflict rather than the verbal aspect tapped by Factor 1. Variables 54 and 55 load relatively highly on both Factors 2 and 4. Both variables are related to common membership in IGO's and NGQ's (as are variables 50 and 52), but they indicate a greater degree of mutuality or similarity in international participatory commitment than do variables 50 and 52. (Refer to Appendix 2). As such, they are used to define Factor 2 rather than Factor 4. Whereas Factor 4 merely demonstrates a somewhat routine transactional type of "overhead" behaviour, Factor 2 implies a greater sense of commonality or co-operation in such participatory behaviour. Variable 59 loads

positively on Factor 2 but negatively on Factor 4. This latter loading seems unexplainable. One answer might be that, given the number of relatively poor nations in the sample, the more they participate in international organizations (or visit each other), the less need they feel to establish often costly diplomatic missions in other countries.

One final, and major, caveat must be made regarding the entire procedure of factor analysis. Many practitioners have noted that "you only get out of it what you put into it". If primarily conflict data is entered, the largest, seemingly most important, factors to emerge will represent conflictual behaviour. It would be erroneous to infer, therefore, that the world was riddled by conflict. To avoid this problem, a reasonably representative mix of indicators was selected that would not bias the results. Furthermore, given that factor analysis is used only as a descriptive, data-reduction technique in this study, no attempt is made to assess the relative importance or salience of the factors other than their ability to account for the variation in the indicators used, and to delineate reasonably representative types of behaviour.

To conclude this discussion of results of the factor analysis, reference is made to the previously-mentioned expected results, as well as the results of others concerned with classifying interstate behaviour.

McClelland's results³³ closely resemble those obtained here. His major conclusion that international behaviour can be reduced to three dimensions is duplicated here by Factor 5 (co-operation), Factors 2 and 4 (participation), and Factors 1, 3, and 6 (conflict). This coincides with the original assumptions made in this study about the major types of behaviour. However, given McClelland's primary focus on conflict behaviour, his results displayed more conflict types than does this study.

In a study examining all major attempts to classify interstate behaviour, the authors noted that "six of these seven solutions [attempts] have converged in their uncovering of several fundamental dimensions of foreign policy behaviour."³⁴ They found that three major dimensions consistently recurred: one involving a participatory type of behaviour, and two involving affective behaviour. Thus, this author feels reasonably assured that the behavioural types arising from the foregoing factor analysis can serve as adequate representatives of the dependent variable.

In order to arrive at more concrete measures of the type and frequency of behaviour, the varimax rotated solution was used to determine factor scores for each type of behaviour exhibited by each directed dyad. Factor scores can be used to locate a case or subject of analysis on orthogonally-extracted dimensions similar to the manner in which objects can be located on variables.³⁵ If a

principal component solution is used and if all the variables in the data set are taken into account, the factor scores have the following properties:

- 1) they are normalized, having a mean of 0 and a standard deviation of 1,
- 2) they predict the original variables exactly to the extent that the variables load on the factors, and
- 3) they are uncorrelated or independent of each other.

This calculation was made for the 182 directed dyads.

Table 7 describes the results, showing for each directed dyad its score on the 6 behavioural dimensions. Since the scores for each dimension have been normalized, a score of 0 (or close to 0) indicates an average amount of behaviour by that directed dyad for that particular type of behaviour. A high positive score indicates an above average amount of a particular type of behaviour, and conversely, a high negative score indicates a below average amount of that particular type of behaviour. Since the factors are statistically independent with respect to type, the scores must be interpreted in this manner. Thus, a high negative score on verbal conflict implies neither verbal approval or support nor a high positive score on any of the less conflictual dimensions.

TABLE 7

Directed Dyad #	Verbal Conflict	Cooperative Coexistence	Armed Conflict	Coexistence	Peaceful Cooperation	Economic Conflict
1	-.04	-1.34	-.24	.01	-.82	-.17
2	.06	-1.72	-.28	-.33	-.67	-.03
3	-.13	-.43	-.19	.76	1.00	-.12
4	-.15	.06	-.22	.03	-.17	-.27
5	-.16	.42	-.20	.35	-.20	-.29
6	-.19	-.41	-.25	-.31	-.58	-.10
7	-.05	.11	-.17	.81	-.61	-.36
8	-.04	-1.52	-.26	-.10	-.81	-.15
9	-.18	1.04	-.17	.61	-.30	-.32
10	-.11	-.07	-.22	.07	-.08	-.31
11	-.10	-.49	-.24	-.07	-.01	-.29
12	-.19	1.04	-.16	.71	-.30	-.30
13	-.02	1.55	-.12	1.32	1.41	-.87
14	-.11	.58	-.16	-.26	-.95	-.16
15	-.07	-.72	-.28	-1.93	2.25	-.49
16	-.06	-.37	-.20	-.37	-.83	-.18
17	-.36	1.35	-.23	-1.38	-.12	-.00
18	-.52	2.03	-.16	-1.11	.42	.23
19	-.39	1.44	-.22	-1.25	-.15	.04
20	-.32	1.16	-.23	-1.43	-.31	-.50
21	-.09	-.64	-.22	-.36	-.87	-.13
22	-.15	.96	-.14	-.20	-1.02	-.13
23	-.29	.44	-.27	-1.50	.04	-.05
24	-.24	-.15	-.28	-1.39	.18	-.07
25	-.39	1.87	-.20	-1.13	-.14	.02
26	-.38	1.80	-.20	-1.15	-.12	.01
27	-.90	.67	-.09	-.36	-.89	-.17
28	-.37	-1.35	-.16	-1.18	2.16	.31
29	-.23	.07	-.07	-.80	1.82	-.11
30	-.33	.03	-.08	-.93	1.85	.12
31	-.53	1.35	8.31	-.64	.09	1.56
32	-.15	-1.21	.46	-.35	5.06	1.58
33	-.01	-.21	-.15	-.47	-.74	-.24
34	-.04	-1.63	-.24	-.63	-.62	-.24
35	-.20	1.30	-.12	-.94	-.43	-.12
36	-.20	1.24	-.08	-.66	1.07	-.25
37	1.27	.36	-.07	-.87	1.10	2.30
38	.00	.91	.05	-.89	-.27	.50
39	6.39	.41	2.93	-.43	-.65	-2.89
40	-.18	1.11	-.11	.61	-1.11	-.10
41	-.37	-1.14	-.23	-.23	-.78	-.18
42	.12	-1.05	-.23	-1.26	2.38	-.80
43	-.27	.39	-.18	-.52	.55	-.07
44	-.15	.69	-.18	-.36	-.03	-.29
45	-.12	.13	-.25	-.75	-.04	-.05

FACTOR SCORES FOR EACH DIRECTED DYAD ON 6 BEHAVIOUR DIMENSIONS, 1965

Notes: Refer to Appendix 1 for directed dyad identification.

TABLE 7 (Cont'd.)

Directed Dyad #	Verbal Conflict	Cooperative Coexistence	Armed Conflict	Coexistence	Peaceful Cooperation	Economic Conflict
46	-.20	.57	-.20	-.44	-.51	-.12
47	-.02	-1.45	-.25	-.32	-.74	-.17
48	-.25	1.17	-.17	-.27	-.62	-.10
49	-.19	.29	-.21	-.42	-.45	-.12
50	-.48	-.64	-.15	-.63	1.47	.46
51	-.30	1.15	-.39	-.44	.20	1.05
52	1.70	1.19	-.08	.27	-.10	.30
53	-.14	.73	-.18	.05	-.32	-.29
54	-.14	-.71	-.25	-.43	-.55	-.11
55	.07	-1.32	-.27	-.90	.48	-.52
56	-.11	-.19	-.23	-.28	-.22	-.26
57	-.17	.83	-.18	-.10	-.38	-.25
58	-.08	-.08	-.23	-.37	.12	-.39
59	-.01	.52	-.16	.49	-.69	-.08
60	-.03	-1.15	-.24	-.01	-.46	-.26
61	-.18	1.22	-.15	.24	-.41	-.27
62	-.10	.14	-.20	-.18	-.21	-.30
63	-.15	-.49	-.20	-.38	.47	-.11
64	.90	1.16	-.50	.16	.35	-.02
65	.35	1.01	-.14	.05	.49	-.50
66	-.16	.47	-.17	.52	-.45	-.23
67	-.20	-1.12	-.19	.35	-.28	-.09
68	-.01	-1.57	5.28	-.35	-.10	.48
69	-.12	-.53	-.23	-.02	-.30	-.21
70	-.18	.18	-.20	.25	-.48	-.18
71	-.10	-.50	-.20	.52	-.71	-.19
72	-.12	.07	-.07	.83	-.95	.02
73	-.12	-1.17	-.27	-.47	-.53	-.11
74	-.15	1.10	-.14	.74	-.24	-.35
75	-.60	-.33	-.18	.62	-.65	-.27
76	-.21	-.77	-.19	.12	.40	-.03
77	-.08	1.33	-.10	1.40	.06	-.40
78	.02	.95	-.04	1.01	1.13	-.27
79	-.23	.98	-.19	-.49	-.64	-.10
80	-.21	-.01	-.23	-.49	-.53	-.06
81	.49	-1.31	-.12	-1.22	5.57	-.94
82	.84	.18	-.58	-.69	-.28	.56
83	-.24	-.75	-.20	-.52	-.65	-.08
84	-.21	1.35	-.16	-.20	-.38	-.16
85	-.10	.22	-.18	-.06	-.97	-.17
86	-.12	-.79	-.27	-.90	-.11	-.20
87	-.26	1.49	-.19	-.37	-.76	.16
88	-.31	.21	-.19	-.65	.05	.09
89	-.26	-.32	-.23	-.61	.16	.32
90	-.08	1.39	3.23	-.11	-.33	-.50

TABLE 7 (Cont'd.)

Directed Dyad #	Verbal Conflict	Cooperative Coexistence	Armed Conflict	Coexistence	Peaceful Cooperation	Economic Conflict
91	-.55	1.94	-1.29	-.85	-1.63	8.98
92	-.18	.69	-.17	.44	-.52	-.23
93	-.12	-1.03	-.26	-.44	-.54	-.13
94	.52	-1.88	-.26	-.43	-.62	-.27
95	-.15	-.50	-.24	-.17	-.63	-.13
96	-.10	.03	-.18	.56	-.80	-.21
97	-.12	.25	-.16	.74	-1.05	-.20
98	-.09	-.80	-.23	.05	-.95	-.14
99	-.32	-1.35	3.34	.03	-.78	-.10
100	-.19	1.37	-.13	.81	-.58	-.27
101	-.13	.10	-.20	.15	-.39	-.26
102	-.12	-.35	-.23	-.10	-.33	-.24
103	-.27	1.26	-.11	.78	.32	-.17
104	.17	1.07	-.11	.54	2.37	-1.23
105	-.13	.65	-.17	-.42	-.97	-.13
106	-.10	-.08	-.20	-.46	-.89	-.14
107	.07	-1.56	-.25	-.71	-.56	-.30
108	-.06	-.39	-.21	-.50	-.80	-.18
109	-.30	1.89	-.22	-1.79	1.85	-.38
110	-.38	1.63	-.23	-1.65	-.03	-.00
111	.12	.01	-.23	-.80	.42	-.76
112	-.13	.79	4.06	-.33	-.90	.21
113	-.13	.80	-.16	-.43	-.96	-.15
114	-.10	-.03	-.20	-.46	-.89	-.14
115	-.31	.31	-.29	-1.71	.13	-.03
116	.08	1.99	-.27	-2.15	2.64	-1.26
117	-.36	1.62	-.23	-1.66	.01	-.03
118	-.13	-.36	-.20	1.09	-.61	-.23
119	-.10	-1.39	-.27	-.10	-.62	-.13
120	-.01	-1.77	-.28	-.52	-.44	-.23
121	-.12	-1.08	-.25	.26	-.70	-.14
122	-.13	-.69	-.22	.66	-.57	-.19
123	-.11	-.38	-.19	1.07	-.36	-.30
124	-.14	-.96	-.25	.20	-.78	-.11
125	-.12	-.32	-.19	1.17	-.59	-.26
126	-.07	-1.59	-.28	-.30	-.56	-.14
127	-.09	-.51	-.20	.95	-.31	-.31
128	-.07	-.99	-.23	.38	-.21	-.29
129	-.17	.75	-.04	4.12	.28	-.39
130	-.27	-.53	-.03	3.04	1.85	-.07
131	-.14	.41	-.18	.11	-.22	-.27
132	-.12	-1.12	-.27	-.68	-.39	-.12
133	.19	-1.06	-.25	-.87	1.14	-.73
134	-.16	-.43	-.23	-.25	-.48	-.12
135	-.14	.02	-.21	-.18	-.21	-.24

TABLE 7 (Cont'd.)

Directed Dyad #	Verbal Conflict	Cooperative Coexistence	Armed Conflict	Coexistence	Peaceful Cooperation	Economic Conflict
136	-.17	.44	-.18	.12	-.26	-.23
137	-.18	-.42	-.25	-.47	-.57	-.09
138	-.14	.49	-.18	.04	-.24	-.28
139	-.13	-1.13	-.28	-.69	-.42	-.10
140	-.15	1.53	-.12	.49	-.03	-.41
141	-.01	.54	-.16	.35	1.22	-.69
142	-.17	1.48	-.12	.58	-.03	-.38
143	1.43	.66	-.34	.30	.56	-.23
144	-.06	.27	-.14	.41	-.56	-.29
145	-.10	-1.22	-.26	-.62	-.29	-.13
146	.60	-1.27	-.15	-1.06	2.73	-.43
147	-.14	-.35	-.22	-.45	-.44	-.13
148	-.13	.18	-.20	-.41	-.19	-.24
149	-.25	.33	-.14	-.04	.45	-.03
150	-.14	-.38	-.22	-.45	-.49	-.09
151	-.06	.74	-.16	-.24	-.24	-.29
152	-.03	-1.52	-.25	-.32	-.75	-.16
153	-.15	1.41	-.13	-.53	.01	-.36
154	-.26	1.28	-.05	.28	2.33	-.28
155	-.30	1.60	-.38	.14	1.07	2.35
156	11.11	.40	-1.24	.31	-.25	2.20
157	-.17	-.14	-.19	1.07	-.56	-.19
158	-.12	-1.30	-.26	-.00	-.51	-.10
159	-.02	-1.69	-.29	-.67	-.34	-.23
160	-.12	-1.13	-.15	.23	-.08	.01
161	-.18	-.62	-.12	.60	-.04	-.01
162	-.15	-.59	-.18	1.63	-.15	.01
163	-.43	-.61	5.04	.27	-.36	-.30
164	-.14	-.08	-.18	1.06	-.35	-.27
165	-.06	-1.51	-.27	-.40	-.05	-.22
166	-.22	1.09	-.02	4.00	.17	-.29
167	-.27	-.51	-.08	.95	.37	.19
168	.60	-1.58	.16	1.20	1.28	1.64
169	-.20	-.27	.11	4.02	2.31	-.07
170	-.37	.16	-.04	1.96	1.13	-.21
171	-.22	-1.36	-.23	.01	.03	.09
172	.77	-1.91	.69	-.31	-.61	-.13
173	.05	-.83	-.20	.76	-.67	.02
174	-.43	-.47	-.38	.41	.09	1.53
175	-.29	-.29	-.09	1.31	1.42	.32
176	-.69	-1.34	.31	.54	.27	3.55
177	-.06	-.18	-.11	1.10	.89	-.46
178	-.08	-1.47	-.28	-.38	-.55	-.13
179	-.16	.40	-.47	3.04	.17	-.24
180	-.10	-.57	-.11	.70	-.13	.21
181	-.16	-1.84	.76	1.23	1.44	6.06
182	-.16	.34	.03	4.10	1.08	-.27

As with the similarity and homogeneity coefficients, the factor scores should not be used to evaluate the behaviour of individual directed dyads on an in-depth basis. However, a quick perusal of the scores does indicate a respectable level of congruence with reality.

For example, all directed dyads including NATO countries only (U.S., U.K., Netherlands) show a high degree of participatory co-existence, and to a certain extent, peaceful co-operation as well. China and Russia are both seen as actively engaged in verbal assaults on the U.S., which concurs with what appears in translations of their press. The border skirmishes between India and China in 1965 are reflected in their high scores on the armed conflict dimension. Throughout 1965, China and Indonesia, as well as China and Burma, paid each other several official visits, and signed numerous agreements and mutually supportive accords. These actions are accurately reflected by the high scores on the peaceful co-operation dimension of the directed dyads involved. The discord between Indonesia and the United States which erupted in 1965 is duly noted by the high scores each directed dyad has on the economic conflict dimension.

Thus, it would appear that the factor scores reflect to a reasonable extent the amount of behaviour

engaged in by the 182 directed dyads along each of the 6 dimensions of behaviour. As such, they constitute the measures of frequency (or amount) and type of directed dyadic behaviour, the dependent variable of this analysis.

Having constructed indices for the independent and dependent variables, it is necessary to choose a method to assess the strength of the hypothesized linkages between the variables. Since the relationships are bivariate, correlation analysis was selected. More complex methods such as multiple regression or canonical correlation are not applicable since their use is generally restricted to assessing the relative strength of multiple independent variables in predicting to a dependent variable or variables.

In selecting correlation as a testing method, an important caveat should be noted. Correlation makes no assumptions about causality. Causation can be in either direction between two correlated variables, or can be mutual. To a greater or lesser extent, correlation is concerned with assessing co-variation in magnitude.³⁶

Given the previously-mentioned assumption about the relative invariability of both available means and distributional pattern of means compared, perhaps roughly,

to the greater flexibility of behaviour, the consequent assumption is made that means determine behaviour. Over a longer time period than considered in this study, this assumption would be questionable. As has been discussed, there are undoubtedly causal chains linking past behaviour to present behaviour, as well as past behaviour to present availability and allocational profile of means. Thus, although the correlation method used here does not directly test for causation between means and behaviour, the assumption that similarity and homogeneity coefficients "predict" or "cause" observed differences in amounts and types of behaviour (respectively) will be implicit throughout the analysis.

In order to apply Pearson product-moment correlations to the data, four conditions must be met:³⁷

- 1) the scale of the measured data must be interval,
- 2) the relationships between the variables must be linear, (If the relationship is curvilinear, the correlation will be misleadingly low.),
- 3) the variables must demonstrate a homoscedastic relationship, (The spread of points around the "line" fitting the data should be similar all along the line.),
- 4) the variables must be normally distributed.

The first three conditions will be assessed by inspection of the scattergrams relating the variables. The fourth condition is approached by normalizing the variables. As mentioned, the factor scores are normalized when calculated. The similarity and homogeneity coefficients used for the correlation analysis have also been normalized. To say that the variables have been normalized does not imply that their distribution is perfectly normal. Using raw data, it is extremely difficult to meet this condition precisely. Standardization, therefore, only approximates this requirement.

The testing consists of correlating the similarity and homogeneity coefficients with the factor scores denoting amount and type of behaviour. Since no relationship has been specified between similarity and type of behaviour, it is necessary to devise a measure to indicate the total amount of behaviour of all types, by summing the factor scores.

Caporaso noted three criteria to be satisfied before one can assume that his indicators are additive:

- 1) The indicators must show some evidence of homogeneity or functional unity.
- 2) The indicators must be standardized so as to

remove differences due to reporting and unit biases in terms of which the variable is expressed. 3) It must be demonstratable, or at least plausible, that the indicators added together are part of a single component or dimension, and not several components.³⁰

As has been mentioned repeatedly, the factor scores representing each type of behaviour are statistically independent. Thus, adding scores would seem to be inadmissible. In a sense, however, this hinges on the assumptions the researcher is prepared to make regarding the nature of the indicators to be added. The factor scores represent the amount of behaviour of each type. The types are independent of each other, but amount is a characteristic of all types. One can add the total number of apples and oranges to get an estimate of the amount of fruit one has. The sum is not indicative of anything but quantity. Similarly, behavioural types can be added to indicate total amount.

Since the factor scores are normally distributed, there are positive and negative values about a mean of zero. In order to sum the factor scores then, the score for each type that was most negative (indicating the least amount of behaviour for that type engaged in by one of the 182 directed dyads) was made equal to one. All other scores

were then marked upward by the same amount. This operation does not alter the distribution of the scores for that type, although the mean is raised above zero by the amount necessary to make the most negative score equal to one. Then, all 6 revised factor scores were added to indicate the total amount of behaviour engaged in by each of the directed dyads. These scores are not absolute indicators but only relative amounts of behaviour demonstrated by the dyads within the sample.

Table 8 lists the sum of the revised scores so calculated. Once again, the reader is advised to treat these numbers with caution, and not to apply too literal a translation to their value. Given a mean of 10.57 and a standard deviation of 2.45, there is, however, some semblance of congruence with reality. Most of those directed dyads whose scores are more than one standard deviation above the mean involve the larger, richer, more developed nations; whereas, the dyads representing smaller, poorer, less developed nations generally have scores well below the mean.

These scores, like those of the other independent and dependent variables, have been normalized. Appendix 3 lists the pertinent descriptive statistics associated with each variable.

To ensure that the method used to calculate the total amount of behaviour of all types did not yield distorted results, a test was conducted to determine their validity. Using the 182 values for each of the

TABLE 8

Directed Dyad #	Total Behaviour	Directed Dyad #	Total Behaviour	Directed Dyad #	Total Behaviour	Directed Dyad #	Total Behaviour
1	7.96	46	9.67	91	17.17	136	10.29
2	7.59	47	7.60	92	10.59	137	8.59
3	9.46	48	10.34	93	8.05	138	10.26
4	9.84	49	9.48	94	7.15	139	7.83
5	10.50	50	10.59	95	8.76	140	11.87
6	8.73	51	11.84	96	8.87	141	11.81
7	10.30	52	13.85	97	10.03	142	11.92
8	7.68	53	10.43	98	8.40	143	12.96
9	11.26	54	8.37	99	11.38	144	10.21
10	9.85	55	8.11	100	11.56	145	7.94
11	9.38	56	9.27	101	9.84	146	10.98
12	11.37	57	10.53	102	9.21	147	8.83
13	13.84	58	9.53	103	12.39	148	9.58
14	9.51	59	10.63	104	13.38	149	10.89
15	9.31	60	8.43	105	9.39	150	8.80
16	8.56	61	11.02	106	8.70	151	10.32
17	9.83	62	9.72	107	7.26	152	7.54
18	11.45	63	9.70	108	8.43	153	11.30
19	10.02	64	12.62	109	11.62	154	13.86
20	9.67	65	11.82	110	9.91	155	15.05
21	8.26	66	10.55	111	9.32	156	23.08
22	9.87	67	9.21	112	14.27	157	10.39
23	8.95	68	14.29	113	9.54	158	8.27
24	8.61	69	9.16	114	8.75	159	7.33
25	10.60	70	9.95	115	8.67	160	9.34
26	10.54	71	9.39	116	11.59	161	10.21
27	9.63	72	10.35	117	9.92	162	11.67
28	9.99	73	7.90	118	10.13	163	14.17
29	11.25	74	11.52	119	7.97	164	10.60
30	11.23	75	9.71	120	7.32	165	8.04
31	20.70	76	9.89	121	8.55	166	15.28
32	15.97	77	12.78	122	9.43	167	11.21
33	8.74	78	13.36	123	10.29	168	13.87
34	7.24	79	9.90	124	8.52	169	16.47
35	10.06	80	9.04	125	10.26	170	13.60
36	11.73	81	13.27	126	7.63	171	8.89
37	14.66	82	10.59	127	10.09	172	9.07
38	10.87	83	9.62	128	9.16	173	9.70
39	16.32	84	10.82	129	15.12	174	11.32
40	10.79	85	9.30	130	14.55	175	12.94
41	7.97	86	8.18	131	10.29	176	13.20
42	9.72	87	10.65	132	7.87	177	11.75
43	10.46	88	9.76	133	8.98	178	7.68
44	10.22	89	9.64	134	8.90	179	13.74
45	9.51	90	14.17	135	9.61	180	10.56
						181	17.95
						182	15.69

SUM OF REVISED FACTOR SCORES ON AGGREGATED DIMENSIONS, 1965

Note: Refer to Appendix 1 for directed dyad identification.

21 original indicators of behaviour, 21 standardized distributions were computed. As for the factor scores, high positive values indicate above average amount of behaviour described by an indicator, while high negative values represent below average levels of activity for an indicator. The lowest score for all 182 cases, for each indicator, was made equal to one, and the 181 scores remaining were each increased by the same amount. Then, for each case, the 21 scores ~~so~~ revised were summed to obtain an overall representation of the level of activity in each directed dyad. These aggregated scores were then compared to the previously-determined scores using a scattergram and Pearson product-moment correlation. The reader is referred to Appendix 4 describing the results. As shown, the results of the two different methods used to calculate total amount or level of behaviour of all types are virtually identical. Given such congruity, all further discussions of results will refer to the results of the original factor score summation method.

To conclude, similarity and homogeneity coefficients have been determined so as to measure the independent variables of means available and allocational profile of means available. Factor scores representing the amount of behaviour along 6 representative affective behaviour dimensions have been computed. To test the hypotheses, the similarity coefficient is

correlated with the total amount of behaviour of all types engaged in by each directed dyad. The homogeneity coefficient is correlated with the type of behaviour exhibited by each directed dyad. Although no exact predictions are made concerning the link between similarity and amount or frequency of behaviour, nor between homogeneity and type of behaviour, it is hoped that the results of the test will demonstrate, by the strength of the correlations between the variables, whether or not the hypotheses derived from the deductive framework are supported.

Footnotes (Chapter 4)

1. To calculate the number of dyads possible out of N objects, use the formula: $(N/2) * (N-1)$.
2. R.J. Rummel et al., The Dimensionality of Nations Project, Research Report No. 67, June 1973, pp. 2-3. Rummel refers to his previous work, Dimensions of Nations, (Beverly Hills: Sage Publications, 1972); and "Some Dimensions in the Foreign Behaviour of Nations," Journal of Peace Research, No. 3, 1966, pp. 201-224. Reference is also made to R. Cattell, "The Principle Culture Patterns Discoverable in the Syntal Dimensions of Existing Nations," Journal of Social Psychology, Vol. 32, 1950, pp. 215-253; and B.M. Russett, "Delineating International Regions," in Quantitative International Politics, ed. by J.D. Singer, (New York: Free Press, 1968), pp. 317-352.
3. See J.D. Singer, "Data-Making in International Relations," Behavioural Science, Vol. 10, 1965, pp. 68-80.
4. T.R. Gurf, Politimetrics, (Englewood Cliffs, N.J.: Prentice-Hall, 1972), p. 45.
5. Ibid., p. 49.
6. R.J. Rummel, "Some Attributes and Behavioural Patterns of Nations," Journal of Peace Research, Vol. 5, 1967, pp. 196-206; and Rummel, 1972, op. cit.
7. M. Haas, "Societal Development and International Conflict," in Conflict Behaviour and Linkage Politics, ed. by J. Wilkenfeld, (New York: David McKay, 1973), pp. 191-207.
8. P.J. McGowan, "Adaptive Foreign Policy Behaviour: An Empirical Approach," in Comparing Foreign Policies, ed. by J.N. Rosenau, (New York: John Wiley, 1974), pp. 45-54.
9. M.A. East, "Size and Foreign Policy Behaviour: A Test of Two Models," World Politics, Vol. 25, 1973, pp. 556-576.
10. S.A. Salmore and C.F. Hermanh, "The Effect of Size, Development and Accountability on Foreign Policy," Peace Research Society Papers, Vol. 14, 1969, pp. 15-30.
11. See H. Alker Jr., "The Long Road to International Relations Theory: Problems of Statistical Nonadditivity," World Politics, Vol. 18, 1966, pp. 623-655.

12. Rummel, 1973, op. cit., p. 6.
13. Ibid., pp. 3-7.
14. C.F. Hermann, "Policy Classification: A Key to the Comparative Study of Foreign Policy," in The Analysis of International Politics, ed. by J.N. Rosenau, V. Davis, and M.A. East, (New York: Free Press, 1972), p. 72.
15. Although McClelland is systemically oriented in his World Event Interaction Survey project, his operational definition of "interaction" parallels the one given here.
16. One of the prime objectives of the CREON (Comparative Research on the Events of Nations) project led by Hermann is to promote discipline-wide standards for the collection and documentation of event data. See C.F. Hermann et al., CREON: A Foreign Events Data Set, (Beverly Hills: Sage, 1973)
17. East, 1973, op. cit., p. 561.
18. R.J. Rummel, "Dimensions of Conflict Behaviour within and between Nations," General Systems Yearbook, Vol. 8, 1963, pp. 1-50.
19. C.A. McClelland, "Action Structures and Communication in Two International Crises: Quemoy and Berlin," Background, Vol. 7, 1964, pp. 201-215; and "Access to Berlin: The Quantity and Variety of Events, 1948-1963," in Quantitative International Politics, 1968, op. cit., pp. 159-186.
20. C.F. Hermann, "What is a Foreign Policy Event?" in Comparative Foreign Policy, ed. by W.F. Hanrieder, (New York: David McKay, 1971), pp. 295-321.
21. E.A. Azar, "Analysis of International Events," Peace Research Reviews, Vol. 4, 1970, pp. 1-113. Azar is the originator of the Conflict and Peace Data Bank (COPDAB) project.
22. A. Legault, J. Stein, J. Sigler, B. Steinberg, "L'analyse comparative des conflits interétatiques dyadiques (CADIC)," études internationales, Vol. 4, 1973, pp. 480-501.
23. C.W. Kegley Jr., S.A. Salmore and D.J. Rosen, "Convergencies in the Measurement of Interstate Behaviour," in Sage International Yearbook of Foreign Policy Studies, ed. by P.J. McGowan, Vol. 2, 1974, p. 325.

24. Ibid., p. 310.
25. See R.J. Rummel, "Understanding Factor Analysis," Journal of Conflict Resolution, Vol. 11, 1967, pp. 444-480; and J.E. Vincent, Factor Analysis in International Relations, (Gainseville: University of Florida Press, 1971); and N.H. Nie, D.H. Bent, and C.H. Hull, Statistical Package for the Social Sciences, (New York: McGraw-Hill, 1970), Ch. 17.
26. Rummel, 1972, op. cit., p. 29.
27. Nie et al., 1970, op. cit., p. 209.
28. For principal component analysis, the correlation matrix uses 1's in the main diagonal as usual, but for common factor analysis, these 1's are replaced by communality estimates (less than 1) as measures of the extent to which the particular variable is expected to share common variance with the other variables. Usually, this estimate is the coefficient of multiple determination (R^2) of that variable with all other variables in the set.
29. Another measure, common variance, describes the variance in one factor that it shares with all other extracted factors. It is calculated by dividing that factor's eigenvalue by the sum of communalities of all the variables.
30. See Vincent, 1971, op. cit., pp. 13-16 and pp. 31-33 for a discussion on the differences between and the relative merits of orthogonal vs oblique rotation.
31. As a check to determine if the variables used to define the factors (those that load highly on each factor) are internally consistent among themselves, the input correlation matrix should be studied. For the 28 intercorrelations required to define the 6 factors, 20 exceeded .5. In general, all 6 factors show reasonable internal consistency, although Factors 5 and 6 are least consistent. This is to be expected since they were the last factors to be extracted, and thus account for the least amount of total variance in the variable set.
32. Nie et al., op. cit., 1970, pp. 217-218.
33. See C.A. McClelland and G.D. Hoggard, "Conflict Patterns in the Interactions among Nations," in International Politics and Foreign Policy, ed. by J.N. Rosenau, (New York: Free Press, 1969), pp. 711-724.

34. Kegley et al., op. cit., 1974, p. 318.
35. See Vincent, op. cit., 1971, pp. 16-20 for a thorough discussion on the calculation and interpretation of factor scores.
36. For an extended discussion on the properties of correlation analysis, see H.M. Blalock Jr., Causal Inferences in Non-Experimental Research, (Chapel Hill: University of North Carolina Press, 1961).
37. G.D. Garson, Handbook of Political Science Methods, (Boston: Holbrook Press, 1971), p. 172.
38. J. Caporaso, "Fisher's Test of Deutsch's Sociocausal Paradigm of Political Integration," International Organization, Vol. 25, 1971, p. 123.

CHAPTER V

Results and conclusions

In order to begin to evaluate the results, the reader is referred to Appendix 5, containing the scattergrams of the independent vs the dependent variables.

The first plot relates similarity to amount or level of behaviour of all types. The similarity coefficient has been normalized, and upward movement along the vertical axis denotes increasing directed dyadic similarity. Likewise, the sum of the factor scores has been normalized, and movement to the right denotes increasing levels of behaviour of all types. Although a trend in the data points is only marginal, there appears to be a vague movement upward and to the right, which tends to support the hypothesis that increasing similarity is related to increasing interstate activity.

The next six plots relate homogeneity to the six types of directed dyadic behaviour. All variables have been normalized, and all points are plotted from the most negative value to those within three standard deviations above the mean. Movement upward along each vertical axis denotes decreasing directed dyadic homogeneity, and movement to the right along each horizontal axis indicates increasing levels of behaviour of each type.

In relating homogeneity to type of behaviour, the hypothesis stated that increasing homogeneity will "predict" increasingly peaceful directed dyadic behaviour. As such,

the scatterplots can be evaluated in two ways. The first is by identifying clusters in the plots. Directed dyads with high degrees of homogeneity should have high values on Factor 2 and 5, co-operative coexistence and peaceful co-operation. Those with low levels of homogeneity should be clustered around high values of Factors 1, 3, and 6 (verbal, armed, and economic conflict). Finally, dyads having values about the mean of the homogeneity coefficient should be grouped along the more neutral type of behaviour of Factor 4, coexistence. The second means of evaluating the plots is to note whether there are any linear relationships linking increasing homogeneity to increasingly peaceful behaviour, with reference to the plots of Factors 2 and 5. By inference, it could be assumed that similar linear relationships could exist for the other types of behaviour. For example, as homogeneity decreases, verbal conflict might increase. However, as has been noted, each type of behaviour is statistically independent of the others. Thus, increasing verbal conflict does not imply decreasing peaceful behaviour. Comparison among the plots should confirm whether or not increasingly peaceful behaviour is inversely related to increasingly conflictual behaviour.

The first plot, homogeneity vs verbal conflict, does not meet expectations. Although a few outlying points demonstrate the reverse of the hypothesis (several directed dyads with above average homogeneity also engage in above

average amounts of verbal conflict), the general expectation that a cluster would appear having low homogeneity and high verbal conflict is not borne out. Relatively low levels of verbal conflict occur no matter the degree of homogeneity.

The second plot, homogeneity vs co-operative coexistence, shows even less of a pattern. Directed dyads with both high and low degrees of homogeneity are spread along the entire continuum of amount of this type of behaviour. Regardless of their homogeneity, directed dyads are as likely to engage in co-operative participatory behaviour with one another as not.

The plot of homogeneity vs armed conflict is similar to that involving verbal conflict. Low levels of armed conflict are equally likely regardless of the degree of homogeneity within dyads.

The fourth plot relating homogeneity to the neutral behaviour type of coexistence, again, does not reveal the expected pattern: a grouping of points along the horizontal line representing average levels of homogeneity. The scatter of points is virtually random.

In the fifth plot, homogeneity vs peaceful co-operation, several data points meet expectations, having above average homogeneity and well above average levels of peaceful behaviour. However, the cluster is not distinct, and the greater majority of the directed dyads reveal no discernible relationship between degree of homogeneity and overtly peaceful co-operation.

The final plot relating homogeneity to economic conflict also fails to indicate the expected pattern. Like the plots of verbal and armed conflict, degree of homogeneity does not appear to affect the level of economic conflict in which directed dyads may be involved. However, a few points reveal a contradictory situation, wherein some directed dyads with above average homogeneity are engaged in high degrees of economic conflict.

In general, the plots relating homogeneity to type of directed dyadic behaviour reveal no patterns, either confirming or refuting the hypothesis. The most distinct relationship to emerge is that between similarity and amount of behaviour of all types. The reader is referred to Table 9 listing the correlations between the variables, as a final test of the strength of the association between the independent and dependent variables.

As mentioned previously, although significance figures are given with each correlation coefficient, the "population" of directed dyads is an enumeration and not a randomly selected sample; therefore, statistical significance is meaningless in the context of this analysis. Each correlation coefficient is a measure of how closely a hypothetical straight line drawn through the data points on the scatterplots fits those points. In other words, it is a "goodness-of-fit" measure used to show the strength and direction of a linear relationship be-

TABLE 2

CORRELATIONS BETWEEN INDEPENDENT AND DEPENDENT VARIABLES - XEROX VERSION 3.01				
PEARSON CORRELATION COEFFICIENTS				
NORMSIMI	NORMSUM .5808	NORMSIMI -- NORMALIZED SIMILARITY COEFFICIENT		
		NORMSUM -- NORMALIZED SUM OF REVISED FACTOR		
SCORES OF EACH TYPE OF BEHAVIOUR				
COEFFICIENT / (CASES) / SIGNIFICANCE				
A VALUE OF .99.0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED				
PEARSON CORRELATION COEFFICIENTS				
	F1	F2	F3	
NORMHOMO	-.0197 (182) S= .396	-.1426 (182) S= .027	.0313 (182) S= .338	
PEARSON CORRELATION COEFFICIENTS				
	F4	F5	F6	
NORMHOMO	.0912 (182) S= .110	.0239 (182) S= .324	.1920 (182) S= .003	
COEFFICIENT / (CASES) / SIGNIFICANCE				
A VALUE OF .99.0000 IS PRINTED IF A COEFFICIENT CANNOT BE COMPUTED				
PEARSON CORRELATION COEFFICIENTS				
F1 -- VERBAL CONFLICT	F4 -- COEXISTENCE			
F2 -- COOPERATIVE COEXISTENCE	F5 -- PEACEFUL COOPERATION			
F3 -- ARMED CONFLICT	F6 -- ECONOMIC CONFLICT			
CORRELATIONS BETWEEN INDEPENDENT AND DEPENDENT VARIABLES				

tween two variables. The closer "r" approaches unity, the more linear the relationship; the closer it approaches -1, the more linear the inverse relationship between the variables. If the value of "r" is squared, the result, termed the coefficient of determination, is considered to be the proportion of variation in one variable that is accounted for or attributable to the variation in the other.

The correlation coefficient between the normalized variables of similarity and total amount of interstate behaviour is surprisingly high, although only 35% of the variation in behaviour is accounted for by similarity. (Strictly speaking, there is no way of telling which variation accounts for which variation. Only the judgement of the researcher, in conjunction with his deductive framework, can be utilized in evaluating the correlation coefficient in this manner.) Although the pattern of the scatterplot does not suggest such a strong relationship, outlying data points possibly contributed to a distortion in the correlation. Nevertheless, a trend appears such that as similarity in the means available to a pair of nations increases, qualified by the means available to the entire system of selected nations, the level of directed dyadic behaviour increases. Results somewhat similar to these are supported in the literature.

Although not dyadic in orientation, Salmore and Hermann concluded in a study that "the amount of a nation's resources determines to a definite, although limited, degree the extent of its participation in the international system."¹ One pos-

sible weakness of their work is the fact that only GNP was used as an indicator of resources or size. Another monadic analysis, done by East², also demonstrated that larger states tend to participate more actively in international relations.

Rummel³, in one of his DON studies, found that the more similar two nations are on seven major attribute dimensions (economic development, size, political orientation, density, Catholic culture, foreign conflict behaviour, and domestic conflict behaviour), qualified by the geographic distance between them, the greater the level of transactions between them. It should be mentioned that his dependent variable, transactions, was not affective in nature, but similar to the type of activities McClelland defined as transactional. In a later study, wherein he examined American external behaviour toward 81 object nations, he found that:

Differences in economic development, size (or power bases), and political orientation from the object nation jointly explain about 27% of the variation in American behaviour. Overall American differences on attributes from the object nation explain about 47% of the variation in United States behaviour.

While his study focused on a similar dependent variable, his independent variables did not coincide with those used in this study, even though most of his indicators were the same as those used here.

As discussed previously, Cobb and Elder's analysis on international integration⁴ found a link between greater dyadic similarity in social welfare, as well as homogeneity with

respect to socioeconomic development, and greater levels of dyadic intercourse. However, their dependent variable of behaviour again differed from that used here, being of a transactional rather than an affective nature.

The Feierabends' analysis, relating level of development to international behaviour, concluded that "transaction level seems to be a matter of wealth and size."⁶ Although transactions included behaviour of all types, their analysis was monadic, not dyadic.

Thus, while no previous analysis tests an hypothesis that exactly parallels the one presented here, others' results lend greater credence to the results in this study.

Turning to an examination of the correlation coefficients between homogeneity and type of behaviour, the results are rather disappointing. There appears to be virtually no relationship between degree of homogeneity and resultant type of directed dyadic behaviour, and thus neither the hypothesis (the greater the degree of homogeneity, the more peaceful the directed dyadic behaviour), nor its suggested converse (the greater the homogeneity, the less peaceful or more conflictual the behaviour), are supported. However, even these "non-results" have certain parallels in previous studies.

Russett⁷, mentioned previously, found that violent conflict was equally likely whether or not nations clustered in terms of common institutional membership, proximity, economic

interdependence, socio-cultural similarity, or similarity of U.N. voting behaviour. Likewise, East⁸ concluded that the size of nations did not discriminate between resultant friendly or hostile behaviour. In other of his DON reports⁹, Rummel found no links between domestic attributes and foreign conflict behaviour.

In a recent study,¹⁰ Rosenau and Hoggard tested two hypotheses relevant to those in this analysis, relating dyadic attributes to resultant co-operative and conflictual directed dyadic behaviour. They were stated as follows:

The foreign conflict behaviour of a national society is likely to be greater in its dissimilar relationships than in its similar ones.... The foreign co-operative (or neutral) behaviour of a society is likely to be greater in its similar relationships than in its dissimilar ones.¹¹

Similarity and dissimilarity were treated as dichotomized distinctions of the dyadic attribute of homogeneity. Homogeneity was defined as "the degree to which the dyadic partners are alike in terms of their main socio-cultural, religious, historical or political traditions or ideologies."¹² This definition parallels somewhat the assumptions underlying the meaning of homogeneity as defined in this study: governments that share norms about the manner in which the means available to them should be allocated in order to optimally pursue their goals are homogeneous.

Their results, like those of this study, were inconclusive. However, they found that similar dyads, when controlled for by

geographic remoteness, were involved in greater amounts of conflict behaviour than had been anticipated.

The primary purpose of the study by Rosenau and Hoggard was to assess the relative potency of national and dyadic attributes as predictors of co-operation and/or conflict. Given the results just mentioned they concluded that:

Empirical distributions of co-operative and conflictual behaviour based on a national attribute typology closely approximated the hypothesized distributions. Those founded on a relational [dyadic] attribute typology, however, were consistently unrelated to the hypothesized distribution.¹³

Although the analysis presented here did not assess the relative potency of national and dyadic attributes, there appears to be a similar lack of relationship between the dyadic attribute of homogeneity and type of behaviour (specifically, peaceful behaviour).

In short, a number of conclusions can be drawn from the results of the empirical tests applied to the hypotheses presented in this study. First, not only the absolute quantity of means available to a nation relative to those existing in the entire system, but also the degree of similarity between members of a dyad in the absolute quantity of means each has at its disposal, appears to "predict", to a limited extent, the level of the resultant behaviour directed by that nation to its dyadic target. Second, the degree of homogeneity between members of a dyad in the manner in which each allocates the means at its disposal, weighted by the manner in which a nation

allocates its means compared to the manner in which the entire system allocates means, appears to be a poor "predictor" of the resultant type of behaviour directed by that nation toward its dyadic target. Increasing similarity does determine somewhat the level of directed dyadic activity. Increasing homogeneity appears unrelated to increasingly peaceful directed dyadic behaviour. The evident support for the first hypothesis must be qualified, while reasons for the lack of support for the second must be offered.

The measures of level and type of interstate behaviour used in this study were perhaps not adequate. Only 21 indicators were chosen to represent the possible behavioural types. If this list were to be expanded to provide greater reliability, the results obtained would be more accurate. However, given a sample of 182 directed dyads, even though considerably smaller than the number of total possible combinations in the international system, it is extremely difficult to fill all cells in the matrix of dyads-by-behavioural indicators meaningfully. Inspection of the matrix used in this analysis revealed that almost half of the data cells, out of a possible 3822, remained empty. Although, in some instances, a zero entry can be meaningful (i.e., a nation was not engaged in armed or economic conflict, etc.), due to the inadequacies of newspaper coverage or other sources of behavioural indicators, many of the data cells can not be filled. One possible remedy is extending the time period

of the analysis to several years. Another is to reduce the dimensions of extracted behaviour from the six used here to three, representing conflict, neutral participation, and co-operation. This could be accomplished, for example, by using the results of second-order factor analysis. The initial principal components could first be rotated obliquely, allowing for intercorrelations among the resultant factors. Then, a second factor analysis, using orthogonal rotation, could uncover independent clusters of factors, each of which would represent more inclusive types of behaviour. However, methodology should not outstrip in complexity the presumed sophistication in variables or indicators. Until more valid generalizations can be made about the relationships between concepts and their indicators, highly complex data manipulations should be regarded as suspect.

This relates to the problem concerning the nature of the indicators selected to represent similarity and homogeneity. In choosing only readily available data, the validity of the indices was compromised. Perhaps, by increasing the number of indicators, first order factor analysis could inductively determine which indicators most strongly tapped the concepts of means available and allocational profile. These indicators, then, could be used to construct an empirically more reliable and consistent index.

As in all quantitative studies, results in this analysis

were undoubtedly affected by the manner in which the testing of the hypotheses was accomplished. Both correlational and factor analysis require several previously-mentioned conditions to be met before their results can be considered with confidence. Although the author tried to meet these conditions, in actuality, the variables fell far short of the optimum desired. Almost all the distributions were highly skewed, abnormally peaked, and frequently had standard deviations that exceeded the range of the data. Evidence of this is apparent in Appendix 3, and in the scatterplots. Most directed dyads had below average homogeneity coefficients, as well as below average levels of behaviour in a number of the dimensions. Since empirical data on the international system can hardly be expected to fall neatly into the proper distributions required for bi- or multivariate analyses, some scholars relax these assumptions. However, there remains some controversy over the effect such a loosening of prior conditions will have on results.

A possible source of the lack of normality in the data may be the fact that nations in the international system demonstrate such extremes in their attributes and behaviour. For example, four nations out of over 140 account for almost 45% of the total world population. One solution to this problem may be to avoid making generalizations about interstate behaviour applicable to all states. For example, the Feierabends, in their previously mentioned study,¹⁴ found

discrepancies in their results when five "major powers" (U.S., U.S.S.R., France, United Kingdom, P.R.C.) were excluded from the analysis. If applied to this analysis, the prescription just mentioned would necessitate some fundamental changes of the assumptions made in deriving the consequences.

Possibly, an even greater source of indeterminance in the results is the static nature of the model. Explanatory attempts not incorporating "time" as a variable necessarily suffer from being simplistic and narrow in scope. Analyses, such as that by Choucri and North, focusing on differential national rates of change in population growth, technological advancement, and resource needs, more accurately reflect the complexity and dynamic nature of interstate behaviour. It is clear that the essentially static bi-variate model tested in this analysis lacks the complexity required to provide more conclusive results. Yet, a compromise must be made between optimum complexity and optimum results. Certainly, this model should not be discarded in its entirety. For example, distinctions could be made between dyadic attributes of extremely large nations and the great majority of much smaller nations. As mentioned previously, the homogeneity continuum could be used to represent more specific issues. An example might be that small, poorer nations are relatively more concerned with economic welfare than with strategic con-

siderations. As such, homogeneity could be reclassified to represent congruence between pairs of nations along either issue, depending on their size. These changes, together with more valid and reliable measures of the variables to be related, would improve the results.

Nevertheless, it would be extremely fortuitous if such a simple model as presented in this study were found to have conclusive results. Rather than discussing, however, the lack of utility in quantifying the apparently overwhelming complexity of interstate relations, it should be obvious to the reader that this analysis, at its heart, assumes that regularities and patterns exist in the international system. By a judicious combination of foresight and hindsight, in conjunction with imagination and perseverance, it is hoped that valid, reliable, and consistent generalizations can eventually be made about the relationships between nations and their behaviour, that not only will serve to advance knowledge for its own sake, but also provide the understanding necessary for nations to pursue their goals peacefully and in harmony.

Footnotes (Chapter 5)

1. S.A. Salmore and C.F. Hermann, "The Effect of Size, Development and Accountability on Foreign Policy," Peace Research Society Papers, Vol. 14, 1969, p. 23.
2. M.A. East, "Size and Foreign Policy Behaviour: A Test of Two Models," World Politics, Vol. 25, 1973, pp. 556-576.
3. R.J. Rummel, "Some Empirical Findings on Nations and their Behaviour," World Politics, Vol. 21, 1969, pp. 226-241.
4. R.J. Rummel, "U.S. Foreign Relations: Conflict, Co-operation, and Attribute Distances," in Peace, War and Numbers, ed. by B.M. Russett, (Beverly Hills: Sage, 1972), p. 72.
5. R.W. Cobb and C. Elder, International Community, (New York: Holt, Rinehart and Winston, 1970), p. 135.
6. I.K. and R.L. Feierabend, "Level of Development and International Behaviour," in Foreign Policy and the Developing Nation, ed. by R. Butwell, (Lexington: University of Kentucky Press, 1969), p. 149.
7. B.M. Russett, International Regions and the International System, (Chicago: Rand McNally, 1967).
8. East, 1973, op. cit.
9. R.J. Rummel, "Domestic Attributes and Foreign Conflict," in Quantitative International Politics, ed. by J.D. Singer, (New York: Free Press, 1968), pp. 187-214.
10. J.N. Rosenau and G.D. Hoggard, "Foreign Policy Behaviour in Dyadic Relationships: Testing a Pre-Theoretical Extension," in Comparing Foreign Policies, ed. by J.N. Rosenau, (New York: John Wiley, 1974), pp. 117-149.
11. Ibid., p. 125.
12. Ibid., p. 125.
13. Rosenau tested the results of his original findings in the 1974 article using several different data sets to determine if a bias in the WEIS data set he originally used had distorted the results. His conclusions remained the same.

See J.N. Rosenau and G.H. Ramsey Jr., "External and Internal Typologies of Foreign Policy Behaviour: Testing the Stability of an Intriguing Set of Findings," in Sage International Yearbook of Foreign Policy Studies, ed. by P.J. McGowan, Vol. 3, 1975, p. 261.

14. I.K. and R.L. Feierabend, 1969, op. cit.

APPENDICES

- Appendix 1 - Directed dyad identification numbers p. 141
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APPENDIX I

DIRECTED DYAD	NUMBER	PAIRED NUMBER		DIRECTED DYAD	NUMBER	PAIRED NUMBER
BRA-BUR	1	14		CUB-USA	52	173
BRA-CHN	2	27		EGP-IND	57	70
BRA-CUB	3	40		EGP-INS	58	83
BRA-EGP	4	53		EGP-ISR	59	96
BRA-IND	5	66		EGP-JOR	60	109
BRA-INS	6	79		EGP-NTH	61	122
BRA-ISR	7	92		EGP-POL	62	135
BRA-JOR	8	105		EGP-URS	63	148
BRA-NTH	9	118		EGP-UNK	64	161
BRA-POL	10	131		EGP-USA	65	174
BRA-URS	11	144		IND-INS	71	84
BRA-UNK	12	157		IND-ISR	72	97
BRA-USA	13	170		IND-JOR	73	110
BUR-CHN	15	28		IND-NTH	74	123
BUR-CUB	16	41		IND-POL	75	136
BUR-EGP	17	54		IND-URS	76	149
BUR-IND	18	67		IND-UNK	77	162
BUR-INS	19	80		IND-USA	78	175
BUR-ISR	20	93		INS-ISR	85	98
BUR-JOR	21	106		INS-JOR	86	111
BUR-NTH	22	119		INS-NTH	87	124
BUR-POL	23	132		INS-POL	88	137
BUR-URS	24	145		INS-URS	89	150
BUR-UNK	25	158		INS-UNK	90	163
BUR-USA	26	171		INS-USA	91	176
CHN-CUB	29	42		ISR-JOR	99	112
CHN-EGP	30	55		ISR-NTH	100	125
CHN-IND	31	68		ISR-POL	101	138
CHN-INS	32	81		ISR-URS	102	151
CHN-ISR	33	94		ISR-UNK	103	164
CHN-JOR	34	107		ISR-USA	104	177
CHN-NTH	35	120		JOR-NTH	113	126
CHN-POL	36	133		JOR-POL	114	139
CHN-URS	37	146		JOR-URS	115	152
CHN-UNK	38	159		JOR-UNK	116	165
CHN-USA	39	172		JOR-USA	117	178
CUB-EGP	43	56		NTH-POL	127	140
CUB-IND	44	69		NTH-URS	128	153
CUB-INS	45	82		NTH-UNK	129	166
CUB-ISR	46	95		NTH-USA	130	179
CUB-JOR	47	108		POL-URS	141	154
CUB-NTH	48	121		POL-UNK	142	167
CUB-POL	49	134		POL-USA	143	180
CUB-URS	50	147		URS-UNK	155	168
CUB-UNK	51	160		URS-USA	156	181
				UNK-USA	169	182

Note: BRA-BUR = 1; BUR-BRA = 14

LIST OF DIRECTED DYADS USED IN THE ANALYSIS

APPENDIX 2

- Variable 3 - defined as units - Total number of bilateral and multilateral treaties and agreements signed between A and B and filed with the Secretary-General of the U.N.
- Variable 4 - defined as $x \times 10^2$ - Total number of bilateral and multilateral treaties and agreements signed between A and B, divided by the total number of treaties and agreements A has with all other nations.
- Variable 5 - defined as units - Total number of official political visits of A to B.
- Variable 6 - defined as units - Total number of co-participation of A and B in international conferences of three or more nations by officials such as chiefs of states, cabinet members, or personal representatives of chief of state.
- Variable 15 - defined as units - Total number of warning or defensive actions taken by A against B being distinctly military in nature but non-violent, such as mobilizations.
- Variable 18 - defined as units - Total number of continuous military actions, discrete military action, and clashes taken by A against B.
- Variable 19 - defined as units - Total days of duration of war, continuous military action, and clash taken by A against B.
- Variable 20 - defined as units - Total number of acts or actions taken by A against B that reflect strained, tense, unfriendly, or hostile feelings or relations between A and B.
- Variable 22 - defined as units - Total number of expulsions or recalls of ambassadors and other diplomatic officials by A of B, not including a severance of diplomatic relations.
- Variable 23 - defined as units - Total number of boycotts (refusals to deal, communicate, buy, negotiate, etc.) and embargoes (commerce) placed by A on B.

- Variable 24 - defined as units - Total frequency of aid to subversive groups in or enemies of B by A.
- Variable 25 - defined as units - Total frequency of official negative communications from A to B involving representative protest, warning, threat, ultimatum, and denunciation.
- Variable 26 - defined as units - Total frequency of negative charges or allegations directed at B by A, not included in Variable 26.
- Variable 27 - defined as units - Total frequency of any official diplomatic communication or governmental statement by the executive leaders of A which has as its primary purpose to protest against the actions of B, not included in Variables 25 and 26.
- Variable 50 - defined as units - Total number of inter-governmental organizations in which both A and B have common membership.
- Variable 51 - defined as $\% \times 10^2$ - The proportion of A's total IGO membership which is accounted for by the measure of variable 50.
- Variable 52 - defined as units - Total number of non-governmental organizations in which both A and B have membership.
- Variable 53 - defined as $\% \times 10^2$ - The proportion of A's total NGO membership which is accounted for by the measure of variable 52.
- Variable 54 - defined as $\% \times 10^2$ - Total membership (i.e., the number of nations in each) of the IGO's to which both nations A and B belong, divided by the total membership of all the IGO's to which nation A belongs. As such, this measures the interaction of dyads in the smaller, more specific oriented intergovernmental organizations, as opposed to co-membership in only the larger IGO's.
- Variable 55 - defined as $\% \times 10^2$ - Total membership of the NGO's to which both nations A and B belong, divided by the total membership of all the NGO's to which nation A belongs.

Variable 59 - defined as $\% \times 10^2$ - The total number of embassies or legations that A has in B, divided by the total number of embassies or legations that A has in all other countries.

Note: These definitions are taken directly from Rummel's Research Report No. 67, describing his data package.

LIST OF THE 21 BEHAVIOURAL INDICATORS USED IN THE ANALYSIS

APPENDIX 3

THE SPSS PCAL PACKAGE FOR THE SOCIAL SCIENCES- XIT-UX VERSION 6.1

VARIABLE NORMOSIM

MEAN = .247231E-05 STD ERR = .7412487E-01 STD DEV = .9999998
 VARIANCE = .9999998 KURTOSIS = 13.43648 SKEWNESS = 3.342871
 RANGE = 7.571330 MINIMUM = -.5476100 MAXIMUM = 6.503700

VALID CASES = 182

MISSING CASES = 0

VARIABLE NORMHOMO

MEAN = -.1300137E-06 STD ERR = .7412487E-01 STD DEV = .9999999
 VARIANCE = .9999998 KURTOSIS = 7.905909 SKEWNESS = 2.670639
 RANGE = 5.307240 MINIMUM = -.9584900 MAXIMUM = 4.348750

VALID CASES = 182

MISSING CASES = 0

VARIABLE NORMSUM

MEAN = .1735739E-06 STD ERR = .7412487E-01 STD DEV = .9999994
 VARIANCE = .9999987 KURTOSIS = 4.818711 SKEWNESS = 1.733554
 RANGE = 6.521040 MINIMUM = -1.397720 MAXIMUM = 5.123320

VALID CASES = 182

MISSING CASES = 0

NORMSIMI -- NORMALIZED SIMILARITY COEFFICIENT

NORMHOMO -- NORMALIZED HOMOGENEITY COEFFICIENT

NORMSUM -- NORMALIZED SUM OF REVISED FACTOR SCORES OF EACH
 TYPE OF BEHAVIOUR

APPENDIX 3 (CONT'D.)

STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES- XEROX VERSION 6.0

VARIABLE F12 VERBAL CONFLICT

MEAN = .3208924E-05 STD ERR = .7392013E-01 STD DEV = .9972374
 VARIANCE = .9944625 KURTOSIS = 90.89594 SKEWNESS = 9.091268
 RANGE = 11.79613 MINIMUM = -.6898360 MAXIMUM = 11.10629

VALID CASES = 182

MISSING CASES = 0

VARIABLE F2 COOPERATIVE COEXISTENCE

MEAN = .3372708E-04 STD ERR = .7391804E-01 STD DEV = .9972091
 VARIANCE = .9944261 KURTOSIS = .9413929 SKEWNESS = .2170547
 RANGE = 3.932925 MINIMUM = 1.907494 MAXIMUM = 2.025432

VALID CASES = 182

MISSING CASES = 0

VARIABLE F3 ARMED CONFLICT

MEAN = .9389369E-06 STD ERR = .7392061E-01 STD DEV = .9972441
 VARIANCE = .9944957 KURTOSIS = 34.64407 SKEWNESS = 5.579678
 RANGE = 9.599257 MINIMUM = -1.289943 MAXIMUM = 8.309314

VALID CASES = 182

MISSING CASES = 0

VARIABLE F4 COEXISTENCE

MEAN = .3607084E-05 STD ERR = .7392043E-01 STD DEV = .9972418
 VARIANCE = .9944912 KURTOSIS = 4.888026 SKEWNESS = 1.600518
 RANGE = 6.272249 MINIMUM = -2.154917 MAXIMUM = 4.117332

VALID CASES = 182

MISSING CASES = 0

VARIABLE F5 PEACEFUL COOPERATION

MEAN = -.5799990E-06 STD ERR = .7392073E-01 STD DEV = .9972456
 VARIANCE = .9944987 KURTOSIS = 8.114196 SKEWNESS = 2.401968
 RANGE = 7.205013 MINIMUM = -1.634244 MAXIMUM = 5.570769

VALID CASES = 182

MISSING CASES = 0

VARIABLE F6 ECONOMIC CONFLICT

MEAN = .1071247E-05 STD ERR = .7392061E-01 STD DEV = .9972438
 VARIANCE = .9944932 KURTOSIS = 42.56564 SKEWNESS = 5.604197
 RANGE = 11.87243 MINIMUM = -2.890501 MAXIMUM = 8.981930

VALID CASES = 182

MISSING CASES = 0

APPENDIX 5

**NORMALIZED SIMILARITY COEFFICIENT VS NORMALIZED
SUM OF FACTOR SCORES OF 6 BEHAVIOURAL TYPES FOR
182 DIRECTED DYADS, (1965)**

APPENDIX 5 (cont'd)

NORMALIZED HOMOGENEITY COEFFICIENT VS
FACTOR 1 (VERBAL CONFLICT) FOR 182 DIRECTED
DYADS, (1965)

Note: To improve readability, the scale was
enlarged, causing the exclusion of
10 values.

APPENDIX 5 (cont'd)

NORMALIZED HOMOGENEITY COEFFICIENT VS
FACTOR 2 (COOPERATIVE COEXISTENCE) FOR
182 DIRECTED DYADS, (1965)

Note: To improve readability, the scale
was enlarged, causing the exclusion
of 8 values.

APPENDIX 5 (cont'd)

NORMALIZED HOMOGENEITY COEFFICIENT VS
FACTOR 3 (ARMED CONFLICT) for 182 DIRECTED
DYADS, (1965)

Note: To improve readability, the scale was
enlarged, causing the exclusion of
14 values.

APPENDIX 5 (cont'd)

APPENDIX 5 (cont'd)

NORMALIZED HOMOGENEITY COEFFICIENT VS
 FACTOR 5 (PEACEFUL COOPERATION) FOR 182
 DIRECTED DYADS, (1965)

Note: To improve readability, the scale
 was enlarged, causing the exclusion
 of 10 values.

APPENDIX 5 (cont'd)

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