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THE MEASUREMENT OF INTERNATIONAL MILITARY COMMITMENTS
FOR CRISIS EARLY WARNING
TR&A Technical Report #33
Threat Recognition and Analysis Project

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THE MEASUREMENT OF INTERNATIONAL MILITARY COMMITMENTS FOR CRISIS EARLY WARNING

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August 1976

The scope of the crisis analysis problem is both wide and complex. It ranges from early-warning--which is concerned primarily with the identification and monitoring of potential threats and dangers to national security--to the management of communication, command, and control during an active crisis situation. This paper presents some research on crisis warning and anticipation, and in particular the development of a charting technique for warning analysts and decision-makers of extant and changing international relations which can affect national security. Two basic assumptions of the research are that national security dangers, vulnerabilities, and opportunities can be identified and monitored; and that such information is useful for reducing the surprise factor of crisis, extending the amount of time for crisis preparation, and increasing the likelihood for early crisis management and avoidance.

Crisis early warning and anticipation varies from other types of crisis studies in that the focus of analysis is on the state and changes in the state of key international system components, structures, and conditions that could threaten national interests and security rather than on the events of active crises. This distinction in perspective is based upon time, and different systemic variables must be monitored and analyzed for early warning than would be the case for the handling of an active crisis situation. Examples of the types of variables that have been watched traditionally for early warning are national resource potential and military capability; national political, economic, and social conditions; conflict and conflict resolution propensities; and the international processes which link local events to other national units.

While there is a good understanding of the types of environmental concerns that need watching for early warning it is not clear that the methods used for such analyses are as systematic or reliable as they could be. Accordingly over the past few years, research supported by the Defense Advanced Research Projects Agency and conducted in both academic and private non-profit institutions has examined the problem of developing quantitative indicators for

defense analysis and early warning. One of these ARPA-supported studies is the Threat Recognition and Analysis Project (McClelland, September, 1975). The objectives of this project have been 1) "a reconceptualization of the tasks of recognizing and appraising threat conditions" and the processes which spread threats internationally, and 2* the development of quantitative indicators for monitoring with empirical charting techniques the location and changing directions and intensity of threat conditions and the international relationships through which these foreign troubles and threats are channeled from a point of origin to other parties. The results reported below describe work completed in the Threat Recognition and Analysis project on the development of a procedure for measuring and monitoring international military commitments as one type of network through which threats are spread among nations.

INTERNATIONAL MILITARY COMMITMENT AS A THREAT SPREADING NETWORK

The importance of military commitment as a key international relationship that affects national defense considerations is recognized widely. Military commitments in the form of alliances and less formal alignments are considered by some foreign policy experts as essential components of balance-of-power politics (Morgenthau, 1973: 181-186) and by others as important generally in the structuring and transformation of international systems (Liska, 1962:12). Empirical analysis of the relationship between military commitments and other international relations phenomena shows that alliance commitments sometimes are related to war, although the direction of the relationship depends on the time period studied (Singer and Small, 1968). Strategic analysts also suggest that military commitments are especially important (among other factors) to the successful execution of war deterrence policies (Snyder, 1961; Schelling, 1966) where they act as signals and warnings of national interest and policy intention. There is evidence, for example, that national decision-makers of communist as well as non-communist nations try to differentiate between strong, weak, and changing commitments and that decision-making perceptions of a defender's commitment are likely constraints on decision options (George and Smoke, 1974). While no military commitment can be considered an absolute guarantee that one nation will come to the military defense of another (Holsti, 1970; Dowty, 1972; Tillema, 1973), highly public images of military commitment do indicate special interests and these interests can lead national decision-makers to use force in

support of an ally in a crisis situation--even when it is not its apparent current policy to use such force. Roland Paul, a counsel to the Subcommittee of the Senate Foreign Relations Committee on United States Security Agreements and Commitments Abroad, has put it in the following way (1973, p. 7).

Sometimes...a commitment can result in this country's becoming involved in the defense of another even if, at the moment of crisis, it may not otherwise be American policy or inclination to become involved.

The vulnerability that military commitments can create for national leaders by potentially linking foreign troubles to national involvement make their analysis important for crisis early warning. The systematic and continuous monitoring of global threat situations and the matching of these situations to international military commitments can help security analysts anticipate for national leaders situations that may create national crises before they require major decision-making efforts, especially if the monitoring system is oriented to track these situations for principal national actors and all other national targets.

In order to provide such an early warning capability, data-based indicators of both threat and commitment are needed. Until recently, however, neither the concept of threat nor military commitment had been operationally defined well enough to permit useful measurement for early warning. Some understanding is available about these situations and relationships, but this knowledge is not very complete nor is it encompassed within a general theory that has causal explanations, predictive capability, or descriptive reliability. There has been a need to explore the meaning and measurement of international commitment and develop preliminary indicators of this relationship which are representative and reliable. Results from analyses completed to date in the Threat Recognition and Analysis project show that empirical techniques of descriptive analysis can be used for charting international military commitments, and that continued research in this area should aid in the development of improved theory as well as defense early warning. A brief examination of some of the main conceptual considerations and findings from the analysis of international commitments completed in the project are given below.

CONCEPTUAL CONSIDERATIONS OF MILITARY COMMITMENTS

A major problem in the conceptualization of international military commitment is that it rarely has been examined as an independent political phenomenon which can be described as well as related empirically to other political concepts. In order to measure international military commitments, therefore, a clear conceptual as well as operational definition must be provided.

An international military commitment, as understood here, is a particular type of international relationship which occurs among nations. The essential feature of a military commitment which distinguishes it from other types of international relations is that it implies that the decision-makers of an actor nation have an explicit interest in the security of another nation, and that this interest could lead to the use of force in support of maintaining the target nation's security. How this implication of support is created is a complex and not yet well understood process, and not the main concern of this report. That international military commitments exist can be accepted, nevertheless, as evidenced in the frequent and common statements of decision-makers and analysts. According to the generally accepted view, international military commitments are based on existing relationships between countries which are created and maintained by particular physical and verbal actions between countries which are observable and variable.

This definition of international military commitment suggests that the maintenance of specific subsystem structures is a very important national interest for some countries, and that evidence of such interest comes from specific types of national behavior. Which behavior patterns indicate military commitments, and how much confidence there is in such indicators is a research problem which only recently has received much attention. Social science analysis does provide, however, considerable insight into questions about the measurement of commitment behavior, including information on military commitment characteristics. Four of the most important of these are briefly reviewed below.

In the sociological as well as military deterrence literature consistent behavioral activity commonly has been assumed to characterize a commitment. The periodic reissuance of similarly worded statements by American decision makers in support of the maintenance of the state of Israel is an example of an assumed commitment based on consistent support behavior, and there are other more complex examples. The sociologist Howard Becker (1960) has noted, however, the tautological fallacy of simply defining

commitment as consistent behavior. Becker in developing a partial theory of commitment, states that to identify a commitment specific factors "independent of the behavior commitment will serve to explain"--which he calls side-bets--must be identified. When a committed party, involved directly in an action pursues an interest that originally was extraneous to the action, then that party has engaged in a side-bet. A side-bet is then an interest that is viewed as a "stake" to remain consistent.

A side-bet can be action consciously taken to increase the reliability of a threat such as the placing of troops in a foreign area to enhance the credibility of a deterrent policy (Schelling, 1966). A side-bet also may exist more as a condition of membership in a particular system or organization than as a clearly conceived rational action. Situations of commitment are affected, for example, by "generalized cultural expectations", to use Becker's phraseology. Foreign policy and strategic analysts are familiar with such expectations (Harkabi, 1966:20) which are often described in terms of diplomatic obligation; national honor, face, and prestige; and credibility. An especially visible demonstration of how these expectations operate was evident recently in the historical events which occurred during the American withdrawal from Vietnam when President Ford (4/4/75), and Secretary of State Kissinger (4/21/75), among others felt it necessary to publicly warn that the United States withdrawal from Vietnam should not be interpreted as a signal of inconsistency in American support policy and that other completely independent commitments were as important to the U.S. after withdrawal as before. National leaders in Japan (4/4/75), the Philippines (4/17/75), and Thailand (5/3/75)--in spite of the warnings and reassurances--registered clearly their perceived expectations and fears about inconsistencies and degradations in American support policy.

Major material investments also can act as side-bets according to Becker. Once an actor has made a major investment in a target, it becomes costly for the actor to lose the investment. The situation of national economic interdependence may be the classic international example but there are others. To some, the latter years of the U.S. involvement in Vietnam were based upon certain expectations held by observers about the amount of American material investment in Vietnam. Several South Vietnamese Senators who once demanded the continuance of U.S. active participation in the war, for example, stated that if the U.S. pulled out of South Vietnam after eight years of direct involvement the "ultimate sacrifice" of 45,000 American dead would be a

"useless gesture" 8/12/73).

Consistent supportive behavior and independent linkages to valuable stakes are two major characteristics of a commitment. A third characteristic is the public nature of a commitment. In order to accurately identify a commitment, there must be explicit evidence of consistent support behavior which can be linked to independent and valuable stakes. Without such evidence the analysis of commitment relationships becomes speculative and guesswork at best. When national decision-makers publicly commit their nations two factors can be assumed to contribute to their interest in maintaining consistency in their future behavior. One factor, which was discussed above, is the concern over "face-saving" and maintaining national prestige, reliability, and credibility. The other condition that very likely affects future decisions is post decision dissonance (Allen 1965) Both of these conditions appear to be expressed in Kissinger's April 21, 1975 statement on American commitments.

Let us understand, too, the nature of our commitments. We have an obligation of steadfastness simply by virtue of our position as a great power upon which many others depend. Thus our actions and policies over time embody their own commitments whether or not they are enshrined in legal documents. Indeed our actions and the perception of them by other countries may represent our most important commitments.

One lesson we must surely learn from Vietnam is that new commitments of our nation's honor and prestige must be carefully weighed. But after our recent experiences we have a special obligation to make certain that commitments we have made will be rigorously kept-- and that this is understood by all concerned. Let no ally doubt our steadfastness. Let no nation ever believe again that it can tear up with impunity a solemn agreement with the United States.

The last major commitment characteristic to be discussed here is that military commitments are manifested in a variety of ways (Russett, 1963; Symington, 1970; Aron, 1973; Paul, 1973), Formal defense treaties, policy support statements and actions, the stationing of troops in foreign countries, the transfer of arms, economic and military aid programs and other international transactions which are reported regularly and openly indicate commitment behavior.

Preliminary data analysis as well as overwhelming conceptual argument in the international relations literature suggest that a multiple indicator can provide the most information about international military commitment behavior.

MILITARY COMMITMENT MEASUREMENT

In the international commitment study a data bank of potential military commitment indicators and some other national attribute and behavior variables has been collected. The relational data have been limited to the collection of information on the military commitment linkages between seven major nations--the United States, United Kingdom, France, West Germany, Japan, China, and the Soviet Union--and 134 target nations. Data have been collected for these relationships on an annual basis for the years 1968 through 1974.

In this paper some example results from analyses of data primarily for the United States and the United Kingdom are provided. Two working assumptions of the commitment analysis are that there may be a variety of approaches for measuring military commitments, and that only the active examination of many possible measurement results will produce indicators useful for crisis anticipation. Analyses so far completed have not led to the selection of the "best" possible measurement approach, but some relatively simple techniques of index construction and commitment pattern display especially useful for early warning missions have been examined. One of these techniques of measurement is based on a multiple variable index. This particular index includes six variables which manifest the commitment characteristics discussed above (Martin, 1975). The six variables are: Defense Agreements, Policy Support Actions, Economic and Military Support Actions, Foreign Troop Deployment, Arms Transfers, and Total Trade. Their operational definitions are given below. (For a complete explanation of data sources and collection procedures see Martin, forthcoming).

1. Defense Agreements. In this study, defense agreements are formally agreed upon bilateral and multilateral defense treaties in force during the year of the data set where the actor or committing nation is obligated in writing to consider, under certain conditions of military threat, intervention with military force on behalf of the target nation. Defense agreements were coded as dichotomous information to indicate the presence or absence of a security treaty.

2. Policy Support Actions. Policy support actions are considered here to be either publicly made declarations of support for maintaining the national security and defense of another nation or active participation in joint military exercises. Either type of action is considered indicative of an interest and implied intention to support militarily the target nation.

Data have been collected on the frequency of such actions from the major committing nation to each target nation for the year of the data set and the previous two years. Three years of data are aggregated together to obtain an effective coverage for the occurrence of such events. Analysis of policy support behavior has shown that decision-makers do not often take such actions nor do such acts occur in any regular time pattern. An indicator of such commitment behavior must span, therefore, a relatively long period of time. The data for this variable have been collected from THE NEW YORK TIMES (WEIS, 1966-1974), TIMES OF LONDON (WEIS, 1969-1974), and DEADLINE DATA ON WORLD AFFAIRS (1966-1974).

3. Military and Economic Support Actions. Military and economic support actions are similar to policy support actions in that only very public events like announcements of aid transactions or aid promises have been included in the data collection. While some information is available on the dollar amounts of aid transactions (some of these data have been collected in the international military commitment study) a decision was made to not use these data because they could not be collected readily for all of the nations under investigation and because the indicator sought was one which focused on especially visible public transactions. Thus, the frequency of military and economic support actions between actor and targets was collected.

The data were collected for a three year period for the same reasons as given for policy support actions, and the data sources were again THE NEW YORK TIMES, TIMES OF LONDON and DEADLINE DATA ON WORLD AFFAIRS. Following the observations of some analysts (GLOBAL DEFENSE, 1969) that military and economic aid can contribute in a similar manner to establishing a commitment relationship between nations, the data for military and economic aid actions were aggregated together.

4. Arms Transfers. Arms transfers were defined as the number of different types of major weapons systems ordered during a two year time period as recorded in the annual editions of the MILITARY BALANCE and the SIPRI YEARBOOK OF WORLD ARMAMENTS AND DISARMAMENTS.

5. Foreign Troop Deployment. The number of deployed troops of the actor nation in target nations as reported in open sources was collected for this variable.

6. Trade. Trade is included in the index described here because it is probably the best single representation of the size of economic involvement and investment of one nation in another and because there is some evidence that economic involvement may be very closely related to images of international commitment (Russett, 1963). For this study the total amount of trade (exports and imports in current dollars) between the actor and target nations has been collected.

These six variables are the components of the international military commitment index. This index takes recognition of the condition that no simple indicator represents well international military commitments. Correlation tests among the six variables listed above have shown that none of these variables are highly associated. A conclusion drawn from these tests--which are supported generally in the literature as noted earlier--is that there does not appear to be any one comprehensive international commitment variable that should be watched by analysts, but that some type of combined index is needed to monitor this complex phenomenon.

The method for index construction used in this study is based upon summed standard (Z) scores for the six variables listed. The approach is neither new (Cutright, 1973) nor without some problems (Marquette, 1972), and has been accepted so far as a good basic measurement technique for the problem at hand. The procedure is to first standardize each variable which transforms linearly the data. The mean (zero) and variance scores for the distribution of cases for each variable is similar, and each variable, in effect, is weighted equally (Levine, 1973). These standardized scores are then summed for the six variables for each actor-target dyad (case) and divided by the number of variables (six) to provide an average military commitment index score for each dyad. These scores describe--according to the index--the degree of the commitment relationships between the actor and each target nation.

For the index measurements described in this paper no weighting factor other than the assumption that each variable has an equal impact on the measurement of a military commitment has been made. This assumption is based in part on the lack of empirical evidence that any one of the variables is a better indicator of international

military commitment and the finding that none of the variables are highly correlated. Weights for the variables derived from factor or regression analysis could, however, be used depending upon the assumptions that the analyst is willing to make. Conceptually derived weights--such as an assumption that a military commitment is more important than the other variables making up the index--might also be used. The testing of such modified indices is planned as well as experiments using simulated data and constructs. Computer software to permit such optional testing from an interactive terminal mode is now available.

DATA FINDINGS

In Tables One through Four, American and British international military commitments for the years 1968 and 1974 as measured by the index and variables described above are presented. Several general conclusions can be stated about United States and United Kingdom commitment patterns on the basis of these results, but first some explanation of the tables and their contents is needed. The scores in each table are average standard or Z-scores, and they can be thought of as a continuum of ranked commitment values with the zero location signifying the mean average amount of commitment from the actor nation to all of the target nations for the particular year of the data set. The more positive a score, the stronger the commitment relationship. Negative scores merely signify a position below the mean average of all of the scores, and the more negative a score the weaker the relationship.

These scores should not be interpreted as probability statements or predictions of the likelihood that a nation will actually come to the military defense of a target nation in a period of crisis or war, although some analysts do consider images of commitment to be predictions of future behavior (Schelling, 1966:53). Analyses of the hypothesis that strong military commitment relationships are associated with actual military support in crises and war must be completed before any confidence can be given to such interpretations. The scores do show clearly, nevertheless, the patterns of American and British international military commitment ties based upon past behavior.

The results in the tables suggest that during the period 1968 to 1974 the international commitments of the United States (1968,1974: $r=.88$) and United Kingdom (1968,1974: $r=.85$) held quite stable. While there were some adjustments in the rank position of target nations over the years, no major system transformation occurred in British

TABLE 1

Index of United States International Military Commitments to 133 Target Nations: 1968
Average Standard Scores for Six Commitment Variables
Treaty, Policy Statements (1), Aid (1), Arms Transfers, Foreign Based Troops, and Trade

South Vietnam	3.005	Trinidad-Tobago	.028	Austria	-.312	Sierra Leone	-.392
Canada	2.288	Peru	.024	Tunisia	-.312	Ecuador	-.393
West Germany	2.255	New Zealand	.022	Paraguay	-.315	Cyprus	-.393
Brazil	1.469	Venezuela	.022	Lebanon	-.316	Equatorial Guinea	-.393
Israel	1.469	Ecuador	.019	Senegal	-.317	Malawi	-.393
Great Britain	1.428	Nicaragua	.012	Cambodia	-.326	Mali	-.393
South Korea	1.089	Bolivia	.009	South Africa	-.327	Mauritania	-.393
India	1.043	Uruguay	.007	Jamaica	-.340	Mauritius	-.393
Netherlands	.896	Indonesia	-.016	Ethiopia	-.342	Rhodesia	-.393
Iran	.861	Costa Rica	-.021	Cuba	-.344	Syria	-.393
Japan	.861	Guatemala	-.021	Soviet Union	-.346	Togo	-.393
Italy	.808	Honduras	-.032	Liberia	-.353	Albania	-.394
Turkey	.778	Haiti	-.034	China	-.354	Botswana	-.394
Norway	.757	Paraguay	-.068	Sudan	-.355	Casamance	-.394
Pakistan	.757	Spain	-.088	Dahomey	-.355	Chad	-.394
Thailand	.719	Burma	-.116	Ogaden	-.355	China	-.394
Belgium	.674	Malaysia	-.122	Nepal	-.355	Gambia	-.394
Luxembourg	.670	Sweden	-.133	Yemen	-.355	Lesotho	-.394
France	.687	Turkmenistan	-.141	Ireland	-.358	Madagascar	-.394
Greece	.681	Saudi Arabia	-.141	Finland	-.358	Malawi	-.394
Portugal	.664	Switzerland	-.173	Kuwait	-.358	Mali	-.394
Philippines	.661	Libya	-.188	Ivory Coast	-.358	Mozambique and Ocean	-.394
Iceland	.643	Morocco	-.189	Uganda	-.358	Niger	-.394
Argentina	.643	Chad	-.196	Czechoslovakia	-.358	North Korea	-.394
Denmark	.643	Sri Lanka	-.203	East Germany	-.358	North Vietnam	-.394
Jordan	.643	Somalia	-.211	Kenya	-.358	Pakistan	-.394
Columbia	.643	Zaire	-.229	Rwanda	-.358	South Yemen	-.394
China, Rep. of	.643	Singapore	-.270	Burundi	-.358	Swaziland	-.394
Mexico	.603	Nigeria	-.270	Central African Rep.	-.358	Tanzania	-.394
El Salvador	.602	Algeria	-.299	Gabon	-.358	Upper Volta	-.394
Australia	.602	Poland	-.299	Hungary	-.358		
Chile	.602	Lebanon	-.308	Iraq	-.358		
Dominican Rep.	.602	Egypt	-.308				
Peru	.602	Zambia	-.311				

TABLE 2.

Index of United States International Military Commitments to 134 Target Nations: 1974
Average Standard Scores for Six Commitment Variables

Treaty, Policy Statements (2), Aid Statements (2), Arms Transfers, Foreign Based Troops, and Trade

West Germany	3.072	Ecuador	.146	Sweden	-.302	Sudan	-.429
Canada	2.257	Columbia	.143	Switzerland	-.309	Barbados	-.430
Israel	2.220	Uruguay	.117	Zaire	-.315	Malagasy	-.430
Japan	1.745	Panama	.103	Yugoslavia	-.318	Tanzania	-.430
South Vietnam	1.560	Nicaragua	.093	Sierra Leone	-.320	Uganda	-.430
United Kingdom	1.292	Honduras	.075	Syria	-.320	Zambia	-.430
Greece	1.135	Bolivia	.060	Algeria	-.333	Bulgaria	-.431
South Korea	1.061	India	.034	Leos	-.339	Cameroun	-.431
Thailand	.976	Dominican Rep.	.023	Botswana	-.340	East Germany	-.431
Cambodia	.928	New Zealand	.011	Gabon	-.362	Guinea	-.431
Italy	.886	Costa Rica	.005	Libya	-.364	Mauritius	-.431
Turkey	.877	Egypt	.004	Ethiopia	-.365	Afghanistan	-.432
Pakistan	.764	El Salvador	.003	South Africa	-.366	Albania	-.432
Netherlands	.746	Trinidad-Tobago	-.001	Muscat and Oman	-.367	Burma	-.432
Belgium	.747	Haiti	-.120	Singapore	-.374	Burundi	-.432
France	.643	Paraguay	-.027	Ivory Coast	-.381	Central African Rep.	-.432
Denmark	.628	Guatemala	-.040	Tunisia	-.382	Congo	-.432
Iran	.583	Mali	-.108	Kenya	-.383	Dahomey	-.432
Peru	.568	Soviet Union	-.119	Sri Lanka (Ceylon)	-.384	Equatorial Guinea	-.432
Norway	.564	Senegal	-.153	Malta	-.386	Gambia	-.432
Saudi Arabia	.537	Mauritania	-.154	Nepal	-.386	Lesotho	-.432
Portugal	.533	Niger	-.154	China, Peoples Rep.	-.398	Malawi	-.432
Brazil	.532	Upper Volta	-.154	Cuba	-.406	Maldives	-.432
Venezuela	.531	Chad	-.155	Austria	-.410	Mongolia	-.432
Chile	.501	Indonesia	-.160	Jamaica	-.411	North Korea	-.432
Luxembourg	.470	Nigeria	-.172	Cyprus	-.413	North Vietnam	-.432
Mexico	.457	Poland	-.176	Ireland	-.416	Rhodesia	-.432
Iceland	.456	Malaysia	-.182	Finland	-.417	Rwanda	-.432
Spain	.426	Bangladesh	-.190	Iraq	-.422	Swaziland	-.432
China, Rep. of	.385	Lebanon	-.219	Chana	-.425	South Yemen	-.432
Australia	.339	Kuwait	-.252	Liberia	-.426	Togo	-.432
Jordan	.303	Rumania	-.278	Guyana	-.427	Yemen	-.432
Argentina	.261	Morocco	-.290	Hungary	-.427		
Philippines	.252			Czechoslovakia	-.429		

TABLE 3

Index of United Kingdom International Military Commitments to 133 Target Nations: 1968
Average Standard Scores for Six Commitment Variables

Treaty, Policy Statements (1), Aid Statements (1), Arms Transfers, Foreign Based Troops, and Trade

West Germany	3.614	Chile	.121	Sierra Leone	-.326	Nicaragua	-.356
United States	2.767	Thailand	.099	Czechoslovakia	-.329	Burundi	-.357
Libya	1.505	Philippines	.094	Iraq	-.329	Cambodia	-.357
Canada	1.284	Switzerland	.092	East Germany	-.337	Dominican Republic	-.357
France	1.210	Brazil	.070	Bolivia	-.338	El Salvador	-.357
Netherlands	1.200	Spain	.053	Algeria	-.340	Senegal	-.357
Singapore	1.188	Ireland	.031	Lebanon	-.340	Central African Rep.	-.358
Belgium	1.023	Muscat and Oman	.021	Zaire	-.340	Chad	-.358
Italy	1.021	South Yemen	.011	Egypt	-.342	Dahomey	-.358
Turkey	.832	Trinidad-Tobago	-.032	Hungary	-.342	Equatorial Africa	-.358
South Vietnam	.808	Saudi Arabia	-.090	Liberia	-.342	Guinea	-.358
Luxembourg	.760	Venezuela	-.097	Morocco	-.342	Haiti	-.358
Denmark	.769	Cuba	-.101	Uganda	-.343	Ronduras	-.358
India	.765	Barbados	-.105	Columbia	-.343	Laos	-.358
Norway	.688	Guyana	-.115	Tunisia	-.343	North Korea	-.358
Nigeria	.671	Rhodesia	-.115	Uruguay	-.346	Reanda	-.358
Iran	.616	Sudan	-.155	Bulgaria	-.350	Senalia	-.358
Australia	.596	Peru	-.157	Burma	-.350	Togo	-.358
Malaysia	.576	Ethiopia	-.169	Ivory Coast	-.351	Yemen	-.358
Portugal	.517	Soviet Union	-.170	Mauritania	-.352	Albania	-.359
Greece	.487	Finland	-.185	Panama	-.352	Botswana	-.359
Iceland	.486	Japan	-.205	South Korea	-.352	Lesotho	-.359
Sweden	.462	Ghana	-.229	Afghanistan	-.354	Malagasy	-.359
Pakistan	.462	Jamaica	-.238	Cameroun	-.354	Maldives	-.359
Zambia	.398	Mauritius	-.256	China	-.354	Mali	-.359
Malta	.381	Israel	-.263	Gambia	-.354	Mongolia	-.359
Indonesia	.373	Poland	-.283	Ecuador	-.355	Nepal	-.359
New Zealand	.319	Cyprus/Greek	-.299	Guatemala	-.355	Niger	-.359
Kuwait	.316	Kenya	-.306	Paraguay	-.355	North Vietnam	-.359
Argentina	.260	China, Peoples Rep.	-.313	Syria	-.355	Swaziland	-.359
Jordan	.174	Rumania	-.322	Congo	-.356	Tanzania	-.359
Sri Lanka (Ceylon)	.150	Mexico	-.324	Costa Rica	-.356	Upper Volta	-.359
Austria	.150	Yugoslavia	-.324	Gabon	-.356		
South Africa	.155						

TABLE 4

Index of United Kingdom International Military Commitments to 134 Target Nations: 1974
Average Standard Scores for Six Commitment Variables

Treaty, Policy Statements (2), Aid Statements (2), Arms Transfers, Foreign Based Troops, and Trade

West Germany	3.066	Switzerland	.140	Yugoslavia	-.322	Guatemala	-.350
United States	2.659	Sweden	.102	China, Rep. of	-.324	Panama	-.350
Pakistan	1.425	Ireland	.096	Czechoslovakia	-.326	Senegal	-.350
Netherlands	1.422	India	.089	Algeria	-.329	South Yemen	-.350
France	1.323	Ecuador	.040	East Germany	-.330	Burma	-.351
Iran	1.205	Zambia	.036	Morocco	-.331	Cameroon	-.351
Belgium	1.151	Indonesia	.014	Hungary	-.334	Costa Rica	-.351
Saudi Arabia	.958	Honduras	-.001	Mauritius	-.335	Nicaragua	-.351
Bangladesh	.882	Tanzania	-.027	Rumania	-.335	Yemen	-.351
Australia	.876	Soviet Union	-.039	Zaire	-.338	Botswana	-.352
Canada	.864	Malta	-.041	Trinidad-Tobago	-.339	Congo	-.352
New Zealand	.834	Ghana	-.061	Guyana	-.340	Dahomey	-.352
Muscat and Oman	.808	Pakistan	-.108	Cuba	-.341	El Salvador	-.352
Nigeria	.666	Finland	-.155	Sudan	-.341	Malagasy	-.352
Portugal	.678	Sierra Leone	-.161	Syria	-.342	Paraguay	-.352
Egypt	.671	Mali	-.177	Sri Lanka (Ceylon)	-.342	Somalia	-.352
Singapore	.654	Niger	-.177	Columbia	-.343	Togo	-.352
Norway	.608	Kuwait	-.180	Barbados	-.345	Albania	-.353
Turkey	.606	Argentina	-.183	Bulgaria	-.345	Burundi	-.353
Denmark	.604	Spain	-.190	Gabon	-.345	Camodia	-.353
Italy	.586	Jamaica	-.197	Uganda	-.346	Central African Rep.	-.353
Malaysia	.514	Lebanon	-.199	Ivory Coast	-.346	Chad	-.353
Iceland	.450	South Korea	-.200	Malawi	-.348	Equatorial Guinea	-.353
South Vietnam	.401	Mexico	-.202	Liberia	-.349	Guinea	-.353
South Africa	.377	Peru	-.208	Afghanistan	-.349	Haiti	-.353
Greece	.349	Jordan	-.218	Dominican Rep.	-.349	Laos	-.353
Israel	.348	Libya	-.229	Ethiopia	-.349	Lesotho	-.353
Thailand	.347	Austria	-.255	Mauritania	-.349	Maldives	-.353
Philippines	.329	Poland	-.285	North Korea	-.349	Mongolia	-.353
Luxembourg	.303	Cyprus	-.296	Swaziland	-.349	North Vietnam	-.353
Nepal	.258	Venezuela	-.302	Tunisia	-.349	Rhodesia	-.353
Brazil	.245	Iraq	-.308	Uruguay	-.349	Reanda	-.353
Kenya	.161	China, Peoples Rep.	-.315	Bolivia	-.350	Upper Volta	-.353
Chile				Gambia	-.350		

TABLE 5
USA Hierarchical Grouping - 1968
Three Group Analysis, Error = 105.4 (N=133)

Group I (3)

CAN *
GMW
VTS

Group II (44)

ARG	ITA
AUL	<u>JAP</u>
BEL	<u>JOR</u>
BOL	KOS
BRA	LUX
CHL	MEX
CHT	NTH
COL	NEW
COS	NIC
DEN	NOR
DOM	<u>PAK</u>
ECU	PAN
ELS	PAR
FRN	PER
GRC	PHI
GUA	POR
HAI	TAI
HON	TRI
ICE	TUR
<u>IND</u>	UNK
<u>IRN</u>	URU
<u>ISR</u>	VEN

Group III (86)

AFG	HUN	RUM
ALB	INS	RWA
ALG	IRQ	SAU
AUS	IRE	SEN
BAR	IVO	SIE
BOT	JAM	SIN
BUL	KEN	SOM
BUR	KON	SAF
BUI	KUW	SYE
<u>CAM</u>	LAO	SPN
CAO	LEB	SUD
CEN	LES	SWA
CEY	LBR	SWD
CHA	LBY	SWZ
CHN	MAG	SYR
CON	MAW	TAZ
COP	MAL	TOG
CUB	MAD	TUN
CYP	MLI	UGA
CZE	MLT	USR
DAH	MAU	UAR
GME	MAR	UPP
GUE	MON	VTN
ETH	MOR	YEM
FIN	MOM	YUG
GAB	NEP	ZAM
GAM	NIR	
GHA	NIG	
GUI	POL	
GUY	RHO	

*Underscored countries have changed groups between the years shown in the table.

TABLE
USA Hierarchical Grouping - 1974
Three Group Analysis, Error = 104.7 (N=134)

Group I (3)

CAN
GMW
JAP

Group II (38)

ARG	ITA
AUL	KOS
BEL	LUX
BOL	MEX
BRA	NTH
CHL	NEW
CHT	NIC
COL	NOR
COS	PAN
DEN	PAR
DOM	PER
ECU	PHI
ELS	POR
FRN	TAI
GRC	TRI
GUA	TUR
HAI	UNK
HON	URU
ICE	VEN

Group III (93)

AFG	HUN	NIG
ALB	<u>IND</u>	PAK
ALG	<u>INS</u>	<u>POL</u>
AUS	<u>IRN</u>	RHO
BGD	<u>IRQ</u>	RUM
BAR	IRE	RWA
BOT	<u>ISR</u>	SAU
BUL	<u>IVO</u>	SEN
BUR	JAM	SIE
BUI	<u>JOR</u>	SIN
CAM	<u>KEN</u>	SOM
CAO	KON	SAF
CEN	KUW	SYE
CEY	LAO	SPN
CHA	LEB	SUD
CHN	LES	SWA
CON	LBR	SWD
COP	LBY	SNZ
CUB	MAG	SYR
CYP	MAW	TAZ
CZE	MAL	TOG
DAH	MAD	TUN
GME	MLI	UGA
GUE	MLT	USR
ETH	MAU	UAR
FIN	MAR	UPP
GAB	MON	VTN
GAM	MOR	<u>VTS</u>
GHA	MOM	<u>YEM</u>
GUI	NEP	YUG
GUY	NIR	ZAM

TABLE 7
 UNK Hierarchical Grouping - 1968
 Three Group Analysis, Error = 86.5 (N=133)

Group I (1)

GMW

Group II (22)

AUL
 BEL
 CAN
 DEN
 FRN
 GRC
 ICE
 IRN
 ITA
 LUX
 MAL
 MLT
 NTH
 NEW
 NOR
 PAK
 PHI
 POR
 SIN
 TAI
 TUR
 USA

Group III (110)

AFG	DOM	KUW	SAU
ALB	ECU	LAO	SEN
ALG	ELS	LEB	SIE
ARG	GUE	LES	SOM
AUS	ETH	LBR	SAF
BAR	FIN	LBY	SYE
BOL	GAB	MAG	SPN
BOT	GAM	MAW	SUD
BRA	GME	MAD	SWA
BUL	GHA	MLI	SWD
BUR	GUA	MAR	SWZ
BUI	GUI	MAU	SYR
CAM	GUY	MEX	TAZ
CAO	HAI	MON	TOG
CEN	HON	MOR	TRI
CEY	HUN	MOM	TUN
CHA	IND	NEP	UGA
CHL	INS	NIC	USR
CHN	IRQ	NIR	UAR
CHT	IRE	NTG	UPP
COL	ISR	PAN	URU
CON	IVO	PAR	VEN
COP	JAM	PER	VTN
COS	JAP	POL	VTS
CUB	JOR	RHO	YEM
CYP	KEN	RUM	YUG
CZE	KON	RWA	ZAM
DAH	KOS		

TABLE 8

UNK Hierarchical Grouping - 1974
 Three Group Analysis, Error = 107.3 (N=134)

Group I (1)

GMW

Group II (20)

AUL
 BEL
 CAN
 DEN
 FRN
 GRC
 ICE
 ITA
 LUX
 MAL
 NTH
 NEW
 NOR
 PHI
 POR
 SIN
 TAI
 TUR
 USA
 VTS

Group III (113)

AFG
 ALB
 ALG
 ARG
 AUS
 BAR
 BGD
 BOL
 BOT
 BRA
 BUL
 BUR
 BUI
 CAM
 CAO
 CEN
 CEY
 CHA
 CHL
 CHN
 CHT
 COL
 CON
 COP
 COS
 CUB
 CYP
 CZE
 DAH
 DOM

ECU
 ELS
 GUE
 ETH
 FIN
 GAB
 GAM
 GME
 GHA
 GMA
 GUI
 GUY
 HAI
 HON
 HUN
 IND
 INS
 IRN
 IRQ
 IRE
 ISR
 IVO
 JAM
 JAP
 JOR
 KEN
 KON
 KOS
 KUW
 LAO

LEB
 LES
 LBR
 LBY
 MAG
 MAW
 MAD
 MLI
 MLT
 MAR
 MAU
 MEX
 MOW
 MOR
 MOM
 NEP
 NIC
 NIR
 NIG
 PAK
 PAN
 PAR
 PER
 POL
 RHO
 RUM
 RWA
 SAU
 SEN
 SIE

SOM
 SAF
 SYE
 SPN
 SUD
 SWA
 SWZ
 SYR
 TAZ
 TOG
 TRI
 TUN
 UGA
 -USR
 UAR
 UPP
 URU
 VEN
 VTN
 YEM
 YUG
 ZAM

and American commitment patterns. These results support the findings of other analysts (Russett, 1972:113-116) that international commitment relationships tend to persist over time and generally are not subject to radical change.

Although there are not numerous and dramatic changes in the rank positions and the commitment scores in the tables, the index does appear to be sensitive to commitment shifts. Reference to the data analyses--including some results not shown--indicate, for example, that South Vietnam ranks at the top of U.S. military commitments for the years 1968 through 1972. In 1973 South Vietnam is replaced at the top of the list by West Germany, and in 1974 by several more nations. India, too, is a good example of a clear shift in the intensity of a military commitment relationship with its drop from a relatively strong military commitment relationship with the U.S. in 1968 to a much weaker one in 1974. Other similar examples of changes in military support activity can be identified in the tables for both the United States and the United Kingdom.

The results in the tables also show that there is a clear and dramatic range of differences in the scores for the commitment relationships. Both the United States and the United Kingdom have a few very strong military commitments at one end of the continuum and many weak relationships at the other. The members of the groups at each end of the continuum are not surprising and indicate what most analysts would generally expect. The United States and United Kingdom are shown to be highly committed to their NATO allies and some of the countries with which they have bilateral or multilateral defense arrangements. The multi-variable index does show, however, that some countries which do not have any formal defense agreements with these major nations also rank high. Israel throughout the years of the study had a very strong commitment from the United States. India apparently did in 1968, as did Jordan in 1969. In 1968 the United Kingdom had a strong military support relationship with Libya which did not include a defense treaty. This relationship was diminished over the seven year period, but in 1974 Saudi Arabia and Bangladesh replaced Libya as nations of special military interest to the British but without the benefit of a formal defense treaty.

The United States maintained throughout the seven years mid-range commitment relationships with many Latin American nations which are members of the Rio Pact. American commitment ties were very weak with most Asian nations and almost all African countries. Communist nations, of course, also ranked low. British commitments, even in 1974, still

showed support activity to some nations "east of the Suez". This is a reflection, in part, of lingering formal defense treaties between Britain and over twenty countries, and perhaps of what has been called a "British concern with maintaining a foothold in world-wide centers of international decision-making..." (Northedge, 1974, p. 161).

In order to provide another view of the ordering of American and British international military commitments a hierarchical grouping analysis was performed on the 1968 and 1974 data sets. Hierarchical grouping analysis is a step-wise technique for reducing the number of elements in a set which are described by several characteristic variables by clustering together the units into smaller numbers of distinct groups according to some particular error measurement (Ward, 1963). The error index used in the procedure described here is "the sum of the squared differences between corresponding scores in the profiles (for six variables), divided by the number of objects in the potential group" (Veldman, 1967). The error index is used generally to locate levels which are particularly interesting because further reduction of the elements is associated with particularly large increases in the error index. In this paper the complete set of groups ($n-1$) and their associated error scores are not provided. Rather, after review of the H-Group analysis for the four years, a three group model was selected to demonstrate how countries with similar commitment characteristics can be combined into somewhat general but clear and distinct groups. Again the analysis is based on standardized rather than raw data scores.

The results of the hierarchical grouping analysis are given in Tables Five through Eight. They show for both the United States and the United Kingdom that countries which had very strong (high index scores) and comprehensive (over many commitment variables) support ties from either of the two actors formed a distinct category of commitment relationship. The United States had such a relationship with West Germany, Canada, and South Vietnam in 1968, and with West Germany, Canada, and Japan in 1974. This is apparently an indication of two very consistent ties and two others which have gone through a transformation over the seven year period. For the United Kingdom only West Germany is identified in the grouping analysis in this special category, although reference to the index for the United Kingdom suggests that the United States must almost make this group.

Group II for both actors includes the bulk of nations

toward which the United States and the United Kingdom had "significant" military commitments. Group III identifies the target nations which either had very weak or no military or economic ties with the actors, or were nations that ranked high on the commitment index but whose ties were narrowly defined in terms of the variables that make up the commitment index. South Vietnam and Israel were two examples for the United States in 1974. Spain in both 1968 and 1974 also was included in this group although it had a relatively high commitment index score in 1974.

In addition to these charting exercises and tests of various commitment indices, analyses have been completed on the relationship between ally commitment patterns (e.g., U.S., U.K. 1974: $r=.64$), as well as adversary or what Aron calls "dual-commitment" patterns (e.g., U.S., U.S.S.R.:1974 $r=-.12$), and on the relationship between international military commitment and a number of national attributes and international behavior variables. From these analyses several partially examined propositions are being developed which should be useful for concept development and for providing further insight into early warning for the defense analyst.

CONCLUSION

An important conclusion derived from the commitment analyses conducted to date is that an indicator which appears to be consistent and reliable has been developed for measuring international military commitments. The indicator is sensitive enough to chart dyadic intensity changes in military support activity and composition, and when matched with an empirical indicator of threat situations will provide analysts with a descriptively simple but comprehensive approach for identifying and discriminating among potential dangers to national security before they require major decision-making efforts in a crisis environment.

It is also recognized that in order to provide more complete analyses of international military commitments for early warning as well as for concept development, research must continue. Results indicate, for example, that not all dyadic commitments for an actor--much less different actors--are the same. Some relationships appear to be extremely consistent over time, others fluctuate somewhat, and some rise and fall in intensity with dramatic changes. No empirical attempt has been made in this project to try to explain why such differences exist, although that is clearly an important question for research. Nor has any empirical

analysis been conducted on the question of measuring the likelihood that a commitment will be fulfilled. In order to answer these questions more extensive data analysis efforts are needed. Even with more analyses there is no assurance, however, that a very complete and generalized theory which can both explain and predict commitment fulfillment can be made available. Commitment fulfillment may be a highly particularistic act dependent to a great extent on the situation at hand. Furthermore, while accurate information of the likelihood and degree that an actor will respond to a commitment would be very valuable for an analyst, it is equally if not more important to have a clear recognition of the "changing state" of an already established military support relationship which will very likely require some type of decision-making response in the event that the target of a commitment relationship becomes endangered militarily.

Given these considerations, we can ask how can a simple descriptive approach for commitment identification and monitoring be applied by the defense analyst? First, the technique for commitment measurement described in this paper can be used by a watch officer as one BASE-LINE INDICATOR for keeping track of threat spreading networks. Other base-line indicators might be developed to monitor changes in resource interdependence, international institutional development, and so forth. A set of such indicators would bring to the attention of analysts information on channels of foreign vulnerability and risk.

Second, the commitment measurement index--as well as any others which might be developed--is an adaptive instrument that can be modified to account for new research findings, user interests, or even changes in the international system itself which require new modes of analysis. The data which are used in the measurement process can be updated annually for periodic tests of military support propensities. Empirical tests of the data collected show, furthermore, that at least one of the component variables--Policy Support Actions--is a quite good "predictor" of the overall index for the United States and United Kingdom. Data for this variable as well as for some of the others can be collected on a daily basis, and can be used to monitor commitments continuously and currently as new data are made available. The index device also can be modified by reducing or increasing the number of component variables. Different operational definitions and data can be applied for any of the variables if subsequent analysis shows that the original ones are inadequate. Simulated data also can be substituted for empirically collected data, and

the scores for any one of the variables or cases can be weighted on the basis of conceptual, mathematical, or statistical decisions. With access to an on-line terminal station (software for such a station is now being tested) the analyst can conduct a wide variety of tests and experiments that suit his particular concerns.

Finally, in a complex watch location threat spreading network analysis can be combined with indicators of threat, military capability, and other national security affairs to provide a watch officer with a comprehensive early warning system. By monitoring with data-based procedures a number of such key international relations indicators defense analysts would be able to recognize early potential situations of national decision-making crises.

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