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QUANTITATIVE INDICATORS OF SELECTED COUNTRY CHARACTERISTICS

Theodore J. Rubin, et al

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13. ABSTRACT

This report is one of a continuing series of reports describing selected results in the development and application of quantitative international affairs indicators. The objective of this research program is to develop a family of quantitative international affairs indicators that will be useful for systematically recording, interpreting, and anticipating significant international phenomena.

In this paper, attention is shifted to results achieved in the development of a second type of international affairs indicators. These indicators are representations of country characteristics selected because of their relevance to national security matters. Country characteristics refer here to phenomena that are significant in international affairs but that, for present purposes, do not directly relate to interaction among countries. That is, characteristics indicators focus on the individual country as the unit of analysis.

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RESEARCH MEMORANDUM
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PREFACE

This report is one of a continuing series of reports describing selected results in the development and application of quantitative international affairs indicators. The objective of this research program, which is sponsored by the Defense Advanced Research Projects Agency (Human Resources Research Office), is the development of a family of quantitative international affairs indicators that will be useful for systematically recording, interpreting, and anticipating significant international phenomena. Results of this program should be of interest to agencies involved in the management of foreign affairs and national security programs.

In addition to the authors, other members of the International Affairs Center who contributed to the research reported here include Mr. Gary A. Hill and Miss Linda Hopkins. In addition, Professor Charles Stone of UCLA provided valuable advice in a consulting capacity.

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I. INTRODUCTION

We use the term "indicator" in international affairs in the same way it is used in other policy sciences, most notably in economics. That is, international affairs indicators are quantitative representations of policy-relevant phenomena that, when viewed over time, trace the evolution of the phenomena and thereby may help anticipate the future.

To date, in the international affairs indicator program, attention has been directed exclusively toward developing indicators that represent selected aspects of behavior among countries. These indicators of behavioral phenomena have been based on event-interaction data.[1] A variety of such indicators, principally relations among countries, policy styles, participation and involvement have been formulated.[2]

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[1] The term event-interaction was coined by Professor Charles McClelland, director of the World Event Interaction Survey (WEIS) Project at the University of Southern California. Event-interactions between countries are defined as actions and responses that are both official (i.e., initiated and received by governmental representatives) and non-routine (i.e., of sufficient importance so that they attract attention and are reported). Event-interaction data consist of chronologies of such actions and responses, both in coded (numerical) form and in summary English language descriptive form.

[2] For an overview of international affairs indicator development based on event-interaction data, see Theodore J. Rubin, International Affairs Indicators for Defense Decision-making (Arlington, Va.: C.A.C.I., RM 305, January 1973). Extensive examples of these indicators may be found in Quantitative Report on International Affairs (1966-1971) (Santa Barbara, Ca.: C.A.C.I., January 1972).

Attempts to validate these indicators and to apply them, both experimentally and operationally, have yielded positive results and are continuing.[3]

In this paper, attention is shifted to results achieved in the development of a second type of international affairs indicators. These indicators are representations of country characteristics selected because of their relevance to national security matters. Country characteristics refer here to phenomena that are significant in international affairs but that, for present purposes, do not directly relate to interaction among countries. That is, characteristics indicators focus on the individual country as the unit of analysis.

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[3] Early experiments and operational applications are reported in Development and Experimental Application of Quantitative International Affairs Indicators, Interim Technical Report No. 1, Vol. 1 (Santa Barbara, Ca.: C.A.C.I., January 1972); Development, Dissemination and Evaluation of Quantitative International Affairs Indicators, Interim Technical Report No. 2 (Santa Barbara, Ca.: C.A.C.I., July 1972); and Theodore J. Rubin and Gary A. Hill, Experiments in the Scaling and Weighting of International Event Data, RM 302 (Arlington, Va.: C.A.C.I., January, 1973).

II. USES OF CHARACTERISTICS INDICATORS

A variety of characteristics concepts are prominent in the vocabulary of the foreign affairs community, such as national power, development, size, wealth, ideology, and so on. Similar to concepts relating to interactional phenomena, these concepts take on the particular shadings and nuances intended by their users. Therefore, they tend in general to be somewhat vague and broadly defined. However, such concepts are frequently used as a means to differentiate countries on dimensions of interest. For example, contrasts are often drawn between highly developed and less developed countries, between rich and poor countries, between militarily strong and weak countries, etc. Characteristics concepts are also often used in ranking processes. For example, countries are described as more or less powerful than others, more or less rapidly developing, etc.

In a family of quantitative indicators, it may be appropriate to define similar uses for indicators of country characteristics. Such indicators should offer a means for differentiating between countries thereby adding richness to the interactional descriptions offered by previously developed indicators.[4] Some of the more obvious uses of characteristics indicators, then, are as follows:

- To assist in the interpretation of indicators of international interaction. For example, two pairs of countries may manifest the same value of relations (R), the quality of their interaction (i.e., $R_{A \leftrightarrow B} = R_{C \leftrightarrow D}$); but A and B may be

[4] Rubin, International Affairs Indicators for Defense Decision-making and Quantitative Report on International Affairs (1966-1971).

"superpowers" while C and D may be less developed countries. The presence of characteristics information should permit the user to distinguish quantitatively between country pairs in kind as well as by behavior, thereby broadening the basis for meaningful interpretation.

- To identify countries in "interesting" states of change relative to national security concerns. Changes in some characteristics may occur gradually and almost imperceptibly; other characteristics changes may be more rapid and pronounced. The ability to compare changes in characteristics among countries, within regions, or within conflict arenas should prove valuable. For example, if a nation located in a region of easing international tensions increases its emphasis on military preparedness, that characteristic takes on added significance.

- To identify characteristics profiles for types of countries that are important from a national security standpoint. For example, if one were to derive a profile of the characteristics of all geographically adjacent country pairs that have engaged in armed conflict recently, then one might seek current analogues among other adjacent country pairs as a possible means to anticipate the potential for new armed conflicts.

III. DEVELOPMENT OF CHARACTERISTICS INDICATORS

Considerable research attention in many university centers has been devoted to the measurement and analysis of country characteristics using attribute variables.[5] Previous work is not replicated here but serves as a point of departure for present purposes.

A relevant finding from the Dimensionality of Nations Project is Sawyer's derivation of the size, wealth, and political dimensions of countries,[6] and his arguments for representing each of these dimensions with a single variable. Sawyer demonstrates that the size concept may be approximated by the variable total population, and the wealth (or development) concept by the variable GNP per capita. He further suggests that the product of population and GNP might well be proximate to the concept of national power, except that "this measure does not directly incorporate military strength."[7]

Since, from a national security standpoint the status of a country's military establishment is of paramount concern, this exclusion is not

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[5] Virtually all university centers and researcher in the field of quantitative international politics have at one time or another employed attribute variables in their research. In view of the widespread attributions in the general literature relative to such variables, data sets, and analyses, no specific references to research centers and individuals are necessary here. However, for one summary of some of the leading collections in the field, see A General Handbook for Long-Range Environmental Forecasting: Data File Descriptions, Vol. II (Arlington, Va.: C.A.C.I., February 1973).

[6] See Jack Sawyer, "Dimensions of Nations: Size, Wealth, and Politics," The American Journal of Sociology, Vol. 73, No. 2 (September 1967).

[7] Ibid.

appropriate to the family of international affairs indicators currently under development. Therefore, we shall attempt to adapt and build on Sawyer's findings in the development of characteristics indicators that are relevant to national security concerns.

A. A CONSTRUCT FOR DEVELOPMENT

To characterize a country for national security purposes one may describe dimensions of the country as a whole, describe similar dimensions within its national security sector, and merge the two to describe various composite dimensions. Table 1 illustrates the dimensions or concepts which have been selected for indicator development within such a construct.

TABLE 1

CONCEPTS FOR INDICATOR DEVELOPMENT

Characteristics of Country as a Whole	Characteristics of National Security Sector	Composite Characteristics
1. National Size	5. Military Size	8. National Power
2. National Product	6. Military Product	9. National Security Emphasis
3. National Development	7. Military Development	10. International Stress
4. Total International Activity		

In Table 1, concepts 1-3 are those encompassed by Sawyer's work. Concepts 5-7 are the counterparts of concepts 1-3 in the national security domain. Concept 4 relates to the degree to which a country

participates "noticeably"[8] as an international actor. The composite concepts are those which integrate national security characteristics with overall country characteristics. Concept 8, national power, as it is viewed here, relates to a country's capacity for participation in international affairs. Concept 9, national security emphasis, relates to the share of a country's resources which are allocated to national security purposes (in a sense, a country's aggregate level of national security mobilization). Concept 10, international stress, relates to a country's level of international participation relative to its capacity for participation (power).

B. DATA CONSIDERATIONS

To avoid undertaking the collection of data for measuring country characteristics, a search was conducted for a continuing source of data on variables that might form the constituent elements for operationally measuring the above concepts. As a result, data were selected from the following two sources for purposes of measurement:

1. World Military Expenditures, U. S. Arms Control and Disarmament Agency. This annual publication contains data on selected aggregate economic and military variables and offers annual worldwide time-series data continuously since 1961. While the data are subject to some important constraints and limitations (which are well documented in the publication), the data are at the same time of consistent quality. The publication lags in preparation by approximately two years; that is, the most recent document, which appended data for 1970 to earlier years, was published July 1972.

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[8] By "noticeably" we mean that its actions are non-routine and therefore attract attention and are reported by observers.

2. World Event Interaction Survey (WEIS). Aggregate data related to country participation in international affairs are drawn from the WEIS data set. Data in this source were collected from 1966 through mid-1971 from the daily New York Times by the WEIS Project at the University of Southern California. Presently this collection is being maintained by C.A.C.I. on a current basis using the same source.

Details about data usage are reported in the following two sections.

C. THE CHARACTERISTICS INDICATORS

Table 2 displays the component variables and the analytically evolved operational measures for each of the national security characteristics concepts that appeared in Table 1. The operational measures are, in effect, the quantitative indicators representing each concept.

It may be seen in Table 2 that various transformations have been applied to the measurement of the composite characteristics indicators. The root transformations have been employed to permit more meaningful interpretation of value changes over time. For example, the power indicator is measured as the product of four quantities. If each of these quantities were to double from one period to another, then their untransformed product would increase by a factor of 16 (2 x 2 x 2 x 2) suggesting a sixteenfold increase in power. However, a more reasonable interpretation of such a change would be that power had doubled. This can be represented by taking the fourth root of the product, since $\sqrt[4]{16} = 2$.

The scaling transformations have been employed to eliminate the inconvenience of small indicator values. For example, untransformed

TABLE 2

CONCEPTS, VARIABLES AND OPERATIONAL MEASURES OF CHARACTERISTICS INDICATORS

Concept	Component Variables		Operational Measure
	Number	Description	
Country as a Whole:			
national size	(1)	total population	people x 10^3
national product	(2)	GNP	current US dollars x 10^6
national development (technology)	(3)	GNP per capita	$\frac{\text{current US dollars}}{\text{people}}$
total international activity	(4)	total actions directed toward the world	number of actions
National Security Sector:			
military size	(5)	military manpower	people x 10^3
military product	(6)	military expenditures	current US dollars x 10^6
military development (technology)	(7)	military expenditures per military man	$\frac{\text{current US dollars}}{\text{military people}}$
Composite Characteristics:			
national power			$\sqrt[4]{(1) \times (2) \times (5) \times (6)}$
national security emphasis			$\frac{\sqrt{(5) \times (6)}}{\sqrt{(1) \times (2)}} \times 100$
international stress			$\frac{(4)}{\sqrt[4]{(1) \times (2) \times (5) \times (6)}} \times 100$

( ) designates component variable numbers

international stress indicator values are typically of the range .9 to .0003. A scaling multiplier of 100 shifts the value range to 90. to .03.

D. THE COUNTRY SAMPLE AND THE DATA FILES

Data have been compiled and indicator values computed for a worldwide sample of 82 countries. The constituent countries are grouped regionally as in Table 3:

TABLE 3

REGIONAL DISTRIBUTION OF THE COUNTRY SAMPLE

Total Countries		82
U.S., USSR, and China		3
Europe/North Atlantic		25
• NATO	12	
• Warsaw Pact	6	
• Other Europe	7	
Latin America		18
Africa		17
• Middle East/ North Africa	13	
• Sub-Saharan Africa	4	
Asia and Oceana		19
• East Asia and Pacific	10	
• South and Southeast Asia	9	

A complete list of the 82 countries for which data exist in computerized files appears in Appendix A.

The values of all indicators are computed on a calendar year basis since data from the first source, World Military Expenditures, are reported in calendar year intervals. For all indicators which rely exclusively on this source for their constituent variables (Indicators 1, 2, 3, 5, 6, 7, 8 and 9 in Table 1), the data files presently include indicator values from 1961 through 1970. For the remaining indicators, annual values begin in 1966, the first year of WEIS data collection.

In addition to the calendar year values for each indicator, the data files contain an index computed to monitor changes over time. The index values are computed using the average of the first two years' indicator values (either 1961-1962 or 1966-1967) as the base period. The base value for each indicator is then divided into each year of data to obtain the index value for that year.

IV. ILLUSTRATIONS OF COUNTRY CHARACTERISTICS INDICATORS

The two issues which must be addressed with respect to the country characteristics indicators relate to their validity and utility. The illustrations that follow will attempt to bear on both issues while acquainting the reader with the substance of the indicators. For most illustrations, attention will be focused on the composite indicators, that is, those that are most highly aggregated and, therefore, most economical in conveying information.

A. SELECTED COUNTRY RANKINGS, 1970

Table 4 displays the fifteen highest ranking countries in 1970, among the sample of 82, on each of three composite characteristics indicators; national power, national security emphasis, and international stress. Ranks for the U.S., USSR, and China are included for each of the indicators whether or not they are among the leading 15 countries. In the table, the 1970 indicator values for each country are normalized by the value of the highest ranking country to create a simple cardinal scale for purposes of comparison. The median value for the 82 country sample is similarly scaled for each indicator. In examining the table an appropriate question to raise is whether the country rankings and the cardinal scale values are reasonable approximations of the reader's own subjective rankings and values.

From the table it can be seen that the power indicator depicts the U.S. and USSR (the "superpowers") as being about twice as powerful as China, five to ten times as powerful as the next highest group of countries (from India to Italy), twenty times as powerful as the group

TABLE 4
1970 COUNTRY RANKINGS FOR SELECTED INDICATORS

	National Power		National Security Emphasis		International Stress	
Rank	Country*	Relative Value 1970	Country*	Relative Value 1970	Country*	Relative Value 1970
1	USA	1.00	VTS	1.00	CAM	1.00
2	USR	.87	ISR	.63	JOR	.88
3	CPR	.50	LAO	.57	ISR	.69
4	IND	.19	JOR	.54	VTN	.66
5	GMW	.16	KON	.51	LAO	.52
6	FRN	.15	VTN	.49	LEB	.39
7	UNK	.13	CHT	.41	LBY	.30
8	JAP	.11	CAM	.40	UAR	.21
9	ITA	.10	ALB	.40	VTS	.16
10	POL	.06	USR	.32	SYR	.14
11	BRA	.06	SYR	.29	LBR	.09
12	PAK	.06	SAU	.28	SUD	.07
13	SPN	.05	POR	.27	PAR	.06
14	CAN	.05	GRC	.26	KEN	.05
15	GME	.05	CUB	.26	TUN	.05
16	----	----	USA	.26	----	----
30	----	----	----	----	USA	.02
34	----	----	CPR	.13	----	----
56	----	----	----	----	USR	.01
73	----	----	----	----	CPR	.005
Normalized Median (82 Countries)		.015		.11		.016

*Country code designations appear in Appendix A (p. 33) which lists the countries included in the data file.

led by Poland, and about sixty to seventy times as powerful as the sample-wide median. Different factors are influential in the rankings achieved by countries. The rankings of India and China, for example, reflect their enormous populations while Japan's is influenced by its very high GNP. Such different bases for rank achievement are considered appropriate in the representation of a multifaceted concept such as power.[9] Elsewhere in the characteristics data file are the values of the component variables of power. These can be examined individually for any country to analyze the basis for its power score and ranking.

The rankings in national security emphasis (hereafter emphasis) are dominated, as one would expect, by countries engaged in international conflict, countries with internal political conflict, and by countries in tenuous strategic situations. In the table, the first group is exemplified by eight countries of Southeast Asia and the Middle East. The second group is exemplified by Portugal and Greece; and the third group by North Korea, Taiwan, Albania, and Cuba. The U.S., USSR, and China all lie above the worldwide median value for emphasis. The U.S. and USSR are among the highest ranking countries while China manifests about half as much emphasis in resource allocations to national security purposes as the U.S. and USSR.

The rankings on international stress (hereafter stress) are dominated by Southeast Asian and Middle East/North African countries, which account for eleven of the highest twelve rankings. The remaining highly ranked countries are so low in power that even low levels of international participation result in stress. With respect to this

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[9] See, for example, Aaron Greenberg and M. R. Leavitt, "Power Base Descriptor" (Arlington, Va.: C.A.C.I., July 1973).

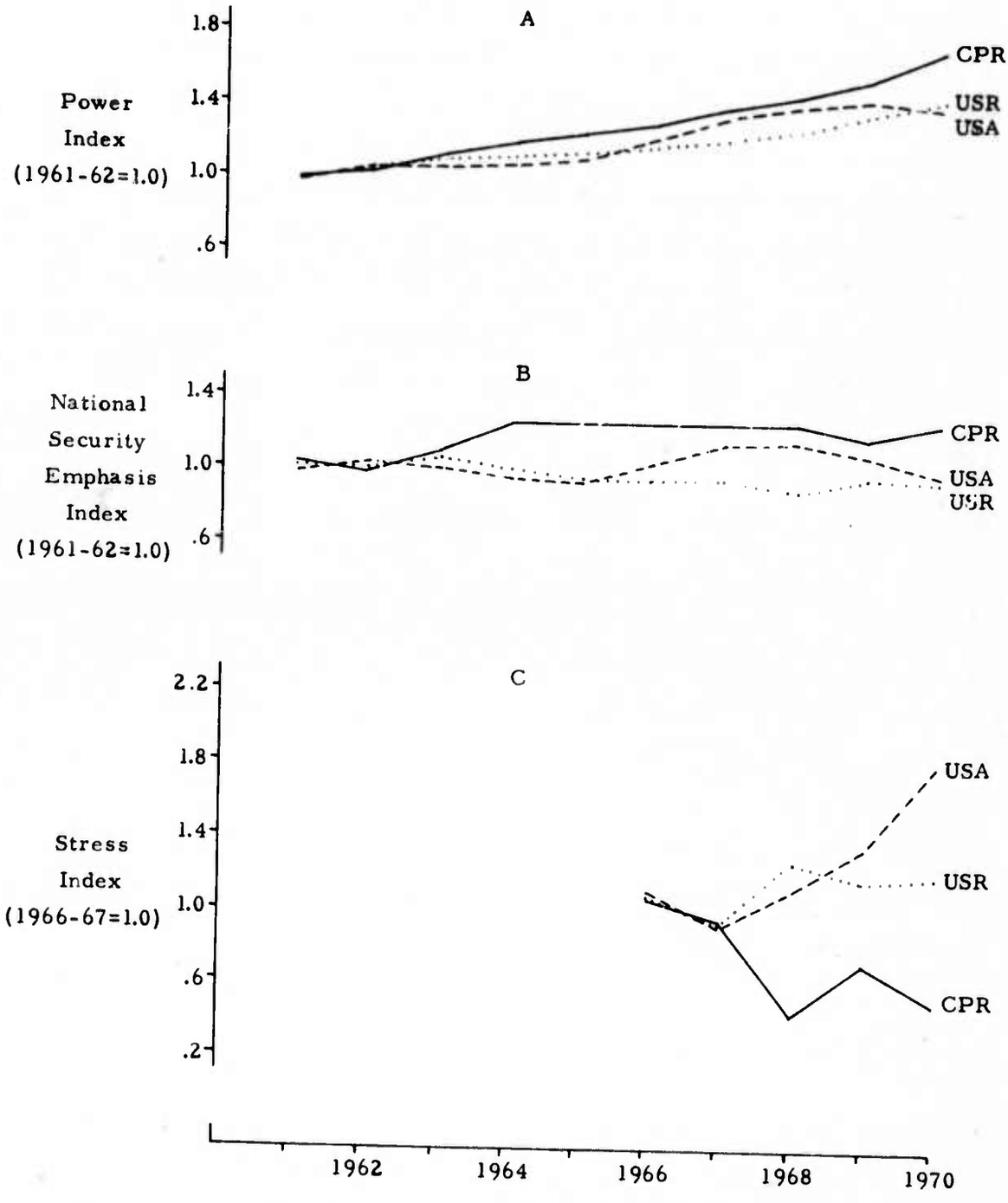
indicator, the U.S., USSR, and China, with their enormous power, tend to rank low despite high levels of international participation. The U.S., for example, even with its intense Southeast Asian involvement, manifests stress only slightly higher than the worldwide median, while stress in the USSR and China lie below the median.

B. CHANGES IN CHARACTERISTICS OVER TIME

The rankings discussed above are a static representation of 1970 country characteristics. Of perhaps greater importance are representations of change. For this purpose we employ the index values referred to earlier and focus on selected examples where these indices depict interesting and related states of change. Again we will, however, limit attention to the three composite characteristics indicators; power, emphasis, and stress.

Figures 1A-1C depict the change over time in power, emphasis, and stress, respectively, for the U.S., USSR, and China. Figure 1A indicates that China's power growth during the 1960's was at a higher rate than that of either of the "superpowers." Similarly, Figure 1B depicts for China the highest rate of growth in emphasis over the period. All of this latter increase, however, occurred between 1962 and 1964 and has since merely been sustained. Emphasis for the USSR was virtually constant over the decade while that for the U.S. increased during the mid-60's and then declined to its earlier level. The general uniformity among the U.S., USSR, and China in power and emphasis changes was in sharp contrast to the stress indices in Figure 1C where the three countries differed markedly. China showed declining stress from the 1966-1967 base period, interrupted only by the 1969 border dispute with the USSR. Stress on the USSR peaked in 1968, coinciding with the Czechoslovakian

Figure 1. Selected Indices of Change for the U.S., USSR, and China



intervention. U.S. stress showed a continuous increase, corresponding to the pattern of escalation in the Southeast Asian war.

Related to the U.S., USSR, and China indicator patterns are those in the two major conflict centers involving big power rivalries in the 1960's, Southeast Asia and the Middle East. Figures 2A-2C display the power, emphasis, and stress indices, respectively, for the principal combatants in Southeast Asia, North and South Vietnam. The Vietnamization program of the Nixon Administration is clearly evidenced in Figures 2A and 2B, where in 1969 and 1970 South Vietnamese power and emphasis rose steeply relative to those characteristics for North Vietnam. The effect, by 1970, is seen in the more rapid stress increase in North Vietnam.

In Figures 3A and 3B, the arms race following the 1967 Middle East War is evidenced by Israel's growing power and emphasis, while those characteristics of the UAR rose more steeply just prior to the war and have subsequently remained at high levels. Figure 3C depicts the increasing stress on both countries during the war year and after 1968 as tension built up again in the area.

In effect, these Southeast Asia and Middle East examples illustrate the phenomenon (since 1969) of major power conflict by proxy, in terms of impacts on the characteristics of the participants.

C. REGIONAL CHARACTERISTICS

Viewing indicators regionally rather than worldwide permits the user to focus on the characteristics of more localized situations which are of continuing interest. Table 5 offers a comparison between NATO and

Figure 2. Selected Indices of Change in Southeast Asia

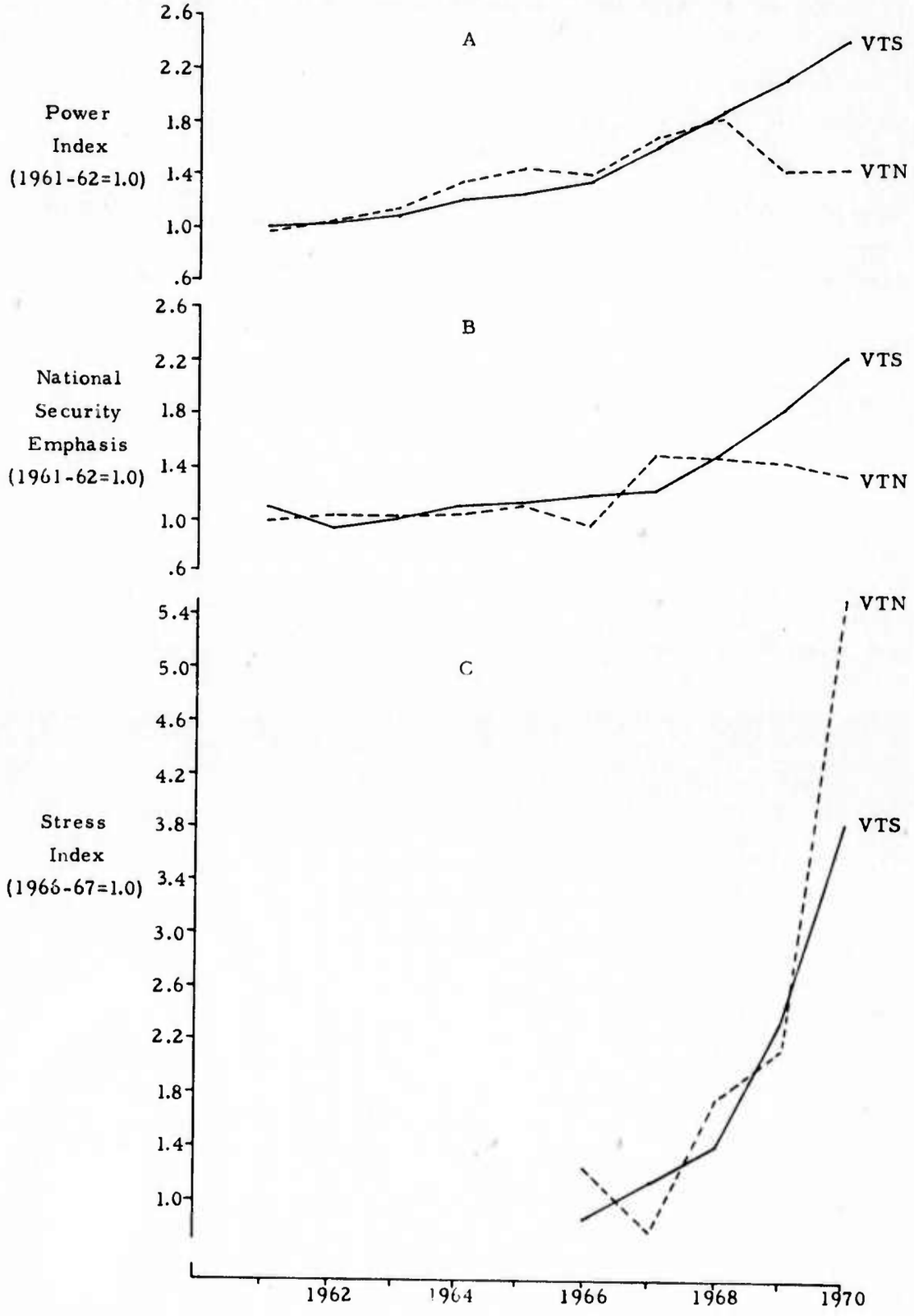


Figure 3. Selected Indices of Change in the Middle East

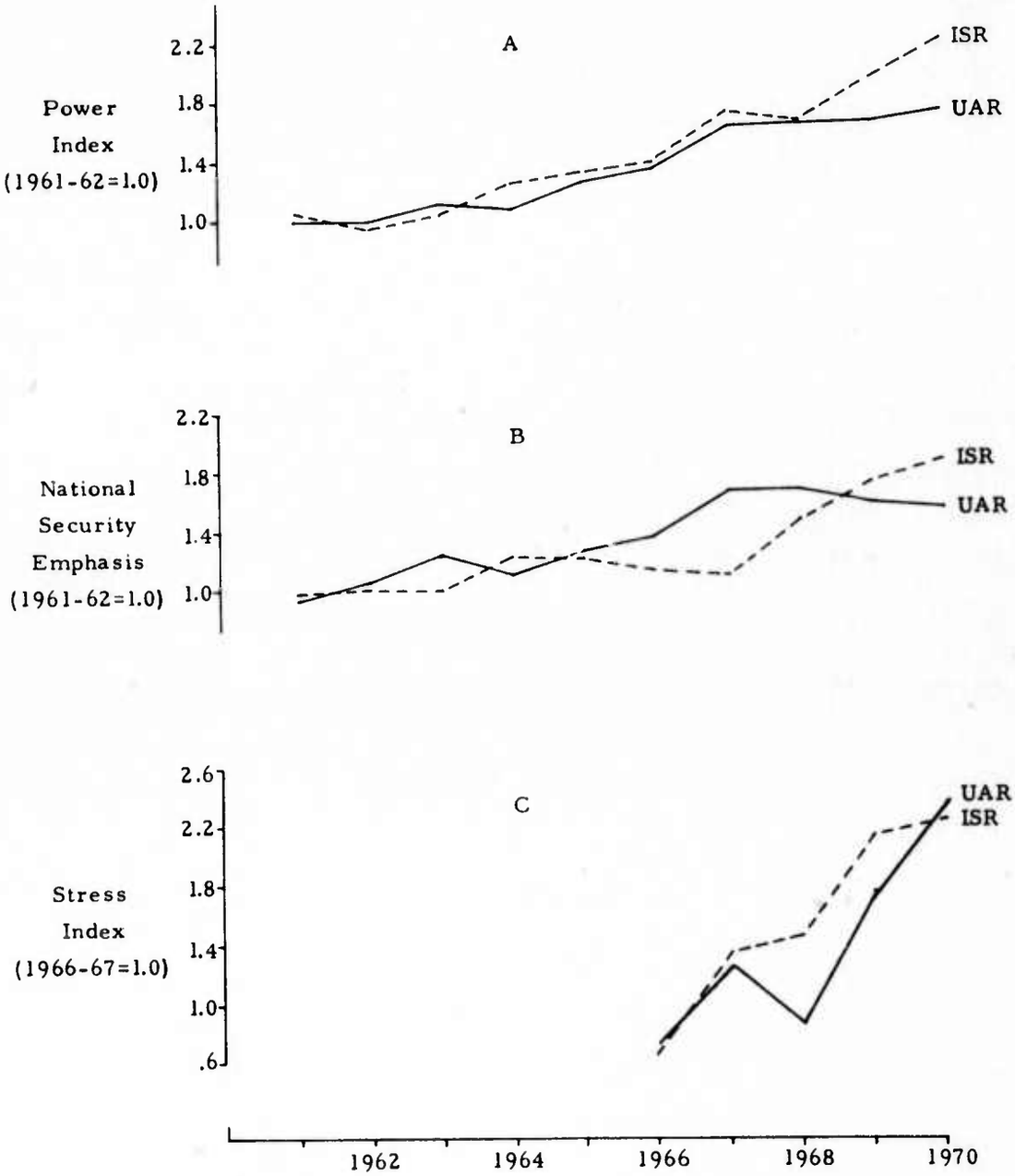


TABLE 5

COMPARISON OF THE CHARACTERISTICS OF NATO AND WARSAW PACT COUNTRIES

Indicator Values - 1970						Change in Indicator Values							
						1961 - 1970				1966 - 1970			
Power		Emphasis		Stress		Power		Emphasis		Stress			
GMW	13,610	POR	.37	POR	1.89	POR	1.91	POR	1.54	NOR	1.32		
FRN	12,269	GRC	.36	UNK	1.75	NOR	1.67	GRC	1.31	GMW	1.16		
UNK	11,148	TUR	.25	GMW	1.62	GMW	1.52	NOR	.97	ITA	.97		
ITA	8,474	FRN	.20	FRN	1.50	GRC	1.46	GMW	.97	FRN	.96		
CAN	4,234	UNK	.18	GRC	1.46	NTH	1.44	DEN	.91	NTH	.83		
TUR	2,818	NTH	.18	NOR	1.26	ITA	1.44	TUR	.89	UNK	.76		
NTH	2,709	NOR	.17	DEN	1.13	DEN	1.44	BEL	.85	DEN	.70		
BEL	2,037	BEL	.17	CAN	1.02	BEL	1.35	ITA	.82	POR	.69		
POR	1,483	GMW	.16	NTH	.66	TUR	1.31	NTH	.78	CAN	.58		
GRC	1,440	DEN	.15	TUR	.50	FRN	1.22	UNK	.77	GRC	.49		
DEN	1,066	ITA	.14	BEL	.49	CAN	1.21	FRN	.66	TUR	.39		
NOR	995	CAN	.10	ITA	.47	UNK	1.13	CAN	.59	BEL	.31		
POL	5,362	GME	.28	GME	2.40	GME	1.83	GME	1.93	GME	1.38		
GME	3,958	CZE	.28	ROM	1.10	HUN	1.54	HUN	1.24	POL	.83		
CZE	3,488	BUL	.25	HUN	.87	POL	1.46	POL	1.00	ROM	.80		
ROM	2,826	HUN	.23	POL	.75	BUL	1.41	BUL	.85	CZE	.69		
HUN	1,833	POL	.22	CZE	.63	ROM	1.35	ROM	.78	HUN	.59		
BUL	1,439	ROM	.18	BUL	.42	CZE	1.17	CZE	.76	BUL	.45		

NATO

Warsaw Pact

NOTES: (1) Dashed line separates countries lying above and below the samplewide median value for each indicator.

(2) NATO, here, excludes USA, ICE, and LUX; Warsaw Pact excludes USR.

Warsaw Pact countries in terms of the characteristics indicators. In the first three columns of the table the constituent countries are ranked from high to low in terms of the 1970 values of the power, emphasis, and stress indicators. The last three columns of the table provide similar rankings for the changes in power and emphasis from 1961 to 1970, and changes in stress from 1966 to 1970. The dashed horizontal lines separate countries lying above and below the samplewide median values for each indicator.

What we wish to examine is whether the phenomenon of Cold War detente in Europe is evidenced in the characteristics represented by the composite indicators. The following comments on each column bear on that issue:

1. 1970 Power. Virtually all the NATO and Warsaw Pact countries lie above the samplewide median for power. West Germany, France, UK, and Italy each manifest a significantly higher power level (capacity for international participation) than any of the Warsaw Pact countries.

2. 1970 Emphasis. Virtually all the countries lie above the samplewide median for emphasis. However, those NATO countries substantially higher in emphasis than the median (Portugal and Greece) were involved in internal conflict situations. Their emphasis may be presumed to have an internal, rather than a Cold War orientation.

3. 1970 Stress. Only four NATO countries and one Warsaw Pact country manifested a stress level higher than the samplewide median. Within NATO, Portugal's stress was associated with its war in Africa.

4. 1961-1970 Power Change. Only five of the 18 countries of NATO and the Warsaw Pact exceeded the samplewide median power increase over the decade of the 1960's. Three of these (Portugal, Norway, and

Hungary) were still small regional powers by 1970 despite their relatively high growth rates over the decade.

5. 1961-1970 Emphasis Change. Not only did 11 of the 18 countries exhibit changes in emphasis lower than the samplewide median for this indicator, but 14 of the 18 actually showed a net decline in emphasis (index value ≤ 1.00). Among NATO countries, only Portugal and Greece, each with previously mentioned internal security problems, increased in emphasis over the decade.

6. 1966-1970 Stress Change. Fifteen of the 18 countries showed a net decline in stress during the 1960's, pointing to a general easing of Cold War tensions. Two of the three countries running counter to this trend are East and West Germany, whose differences have been among the last and most difficult to reconcile in the detente.

In summary, the indicators depict a region that, by the end of 1970, was characterized by two relatively powerful blocs of countries, with generally high but declining national security emphasis and with generally low and declining international stress. This pattern portrays some of the relevant phenomena of East-West detente in Europe.

The impressions drawn from these characteristics indicators may be verified and the measurement of the Cold War detente broadened by the introduction of selected displays of a previously developed indicator, specifically, relations between countries.[10] Relations are systematically measured using event data and are displayed along a friendly to hostile scale having a range of +1 to -1.

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[10] Rubin, International Affairs Indicators for Defense Decision-making and Quantitative Report on International Affairs (1966-1971).

Relations between NATO and Warsaw Pact countries from 1966 through 1970 appear in Figure 4A. This figure illustrates the improvement in relations between the two blocs by the end of 1970. The trend in improvement, it is also seen, was interrupted and delayed by events in Czechoslovakia during 1968 and by the lingering aftereffects of these events through the first half of 1969.

Figure 4B illustrates the relations of the countries of Western Europe and the North Atlantic with the U.S. and the USSR. This country group includes countries other than NATO members, but for purposes of this illustration, the two may be considered the same. In this instance, we see the steadily positive relationship between the U.S. and its "partners." We also see the reconciliation between these countries and the USSR subsequent to the Czechoslovakian crisis.

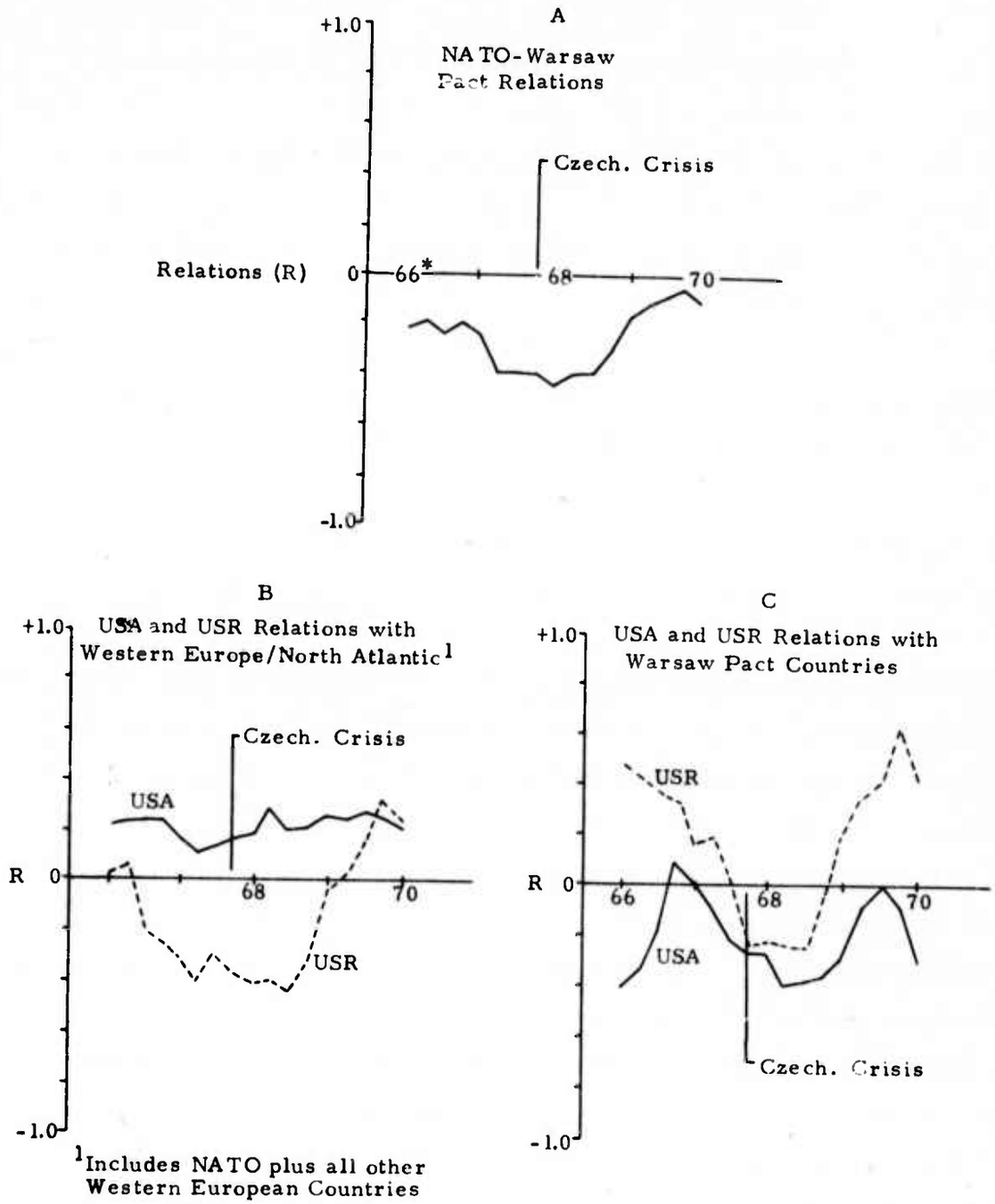
Figure 4C depicts the relations of the Warsaw Pact countries with the U.S. and USSR. In this instance, the Czech crisis was also a dominant factor during the 1968-1969 period. However, by late 1969, the USSR-Warsaw Pact relationship was returning to its pre-crisis quality and U.S.-Warsaw Pact relations followed suit.

Although complicated by the Czechoslovakian affair, all the relationships illustrated suggest a general trend toward East-West detente. Of more pertinence here is the idea that the characteristics and behavioral indicators can be used together to provide multidimensional views of worldwide or regional trends.

D. ANTICIPATING FUTURE INTERNATIONAL DEVELOPMENTS

To the extent that international affairs indicators satisfactorily represent past and present phenomena, they provide information that is

Figure 4. Selected Indications of Cold War Detente



*The initial relations value is computed for a 12 month period ending Dec. 31, 1966. Subsequent values are computed each 3 months for the preceding 12 months.

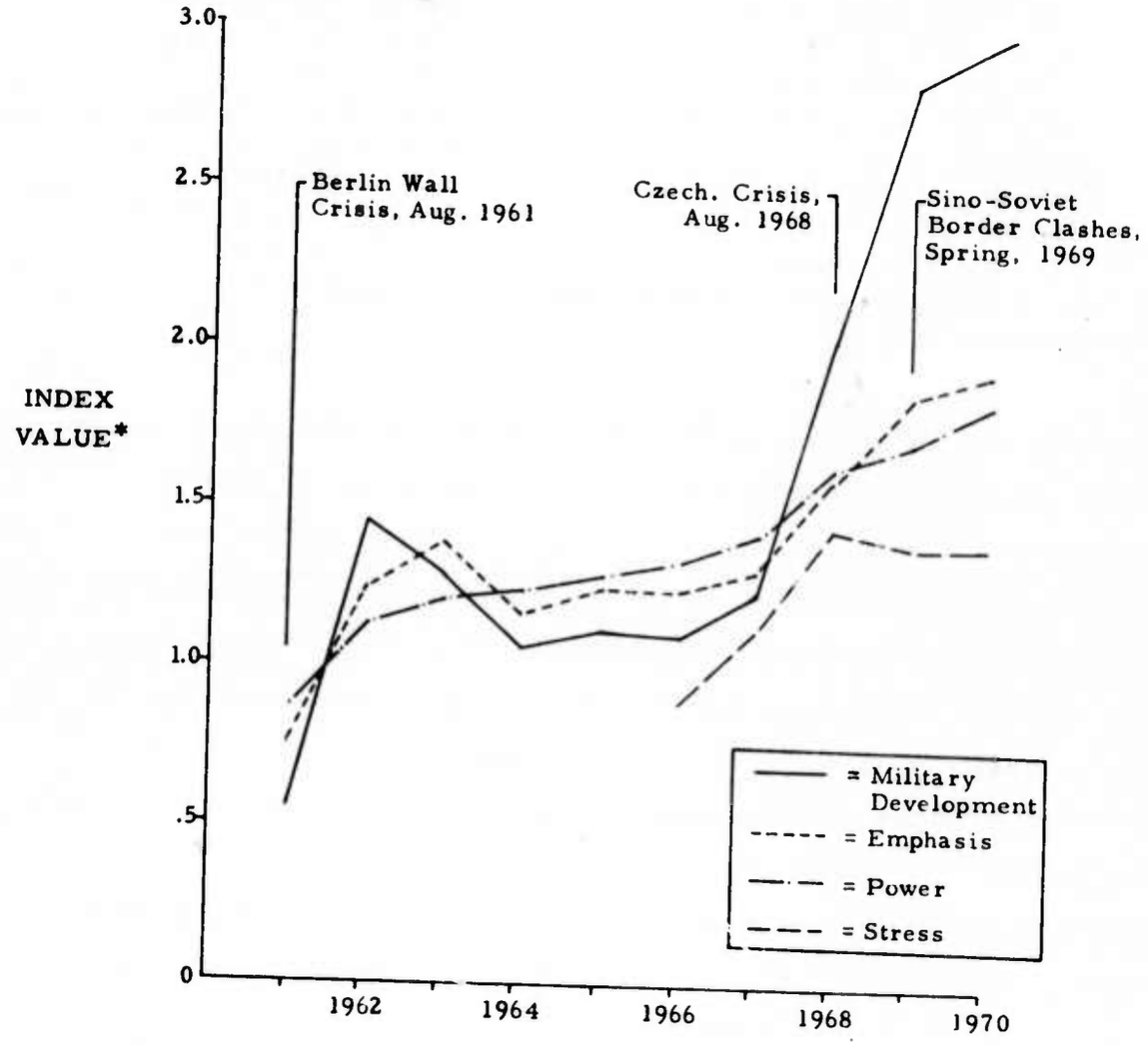
useful contextually. More intriguing uses, however, relate to inferences about the future that may be drawn from the indicators.

An example in point is the nonconforming characteristics pattern of East Germany relative to other NATO and Warsaw Pact Countries. Returning to Table 5, East Germany's performance during the 1960's can be seen as nontypical for a major power of the region. Specifically, the East German pattern does not appear to be consistent with regional detente. The question is "Why?"

Before speculating on that question, consider Figure 5 which displays the change in East German characteristics over time. The figure presents changes in terms of index values for four indicators; power, emphasis, stress, and military development. The latter, it may be recalled, is measured as military expenditures/military manpower.

The 1970 values in Figure 5 are, of course, identical with those tabulated in Table 5. But viewed as time series, the evolving patterns of change provide a richer basis for interpretation. Among the three indicators with a common index base period (emphasis, power, and military development) it can be seen that power is the most stable indicator; that is, it manifests the least amount of change over time and fluctuation about the trend line. The other two indicators seem responsive to crisis situations such as those noted on the figure. Specifically, the figure suggests that emphasis and military development rise sharply in temporal proximity to crises. Note the "buildup" in both indices adjacent to the Berlin Wall and Czechoslovakian Crises. The stress indicator seems similarly responsive to crises over its shorter history. It will be interesting from the standpoint of anticipating the future to see if the lead-lag relationships among these indicators in times of crises, which are apparent here, persist for other cases.

Figure 5. Selected Indices of East German Characteristics, 1961-1970



*Base period for the military development, emphasis and power indices is 1961-1962. Base period for the stress index is 1966-1967.

We may now deduce a possible explanation for the nonconformity of East German characteristics. First, we postulate a scenario relative to current Soviet intentions and then, with the help of selected indicators, pursue the scenario into the future. Let us assume the following:

> The USSR desires European detente, including withdrawal of foreign military forces, so that it may both benefit from trade with Western countries and concentrate its energies and military forces on its most pressing security problem, the political and ideological dispute with China. Detente with the West will be acceptable only if Soviet hegemony in Eastern Europe can be maintained. To maintain Soviet hegemony in the face of withdrawal of Soviet forces, a militarily strong and politically reliable surrogate for USSR presence is required.

Returning to Figure 5, we see that the increases in East German emphasis and stress attributed to the Czechoslovakian Crisis persisted through the Sino-Soviet Crisis of 1969 and showed no signs of diminishing by the end of 1970. Over the same period, East German military development increased out of all proportion to its earlier pattern or to patterns for other countries in the region. In fact, as compared with the base period, 1961-1962, East German military manpower rose by 40% by 1970 and military expenditures rose by over 300%. This military buildup occurred in a region that, as pointed out in Table 5, manifested an overall decline in national security emphasis despite general exposure to the same regional crises. It would appear then, that perhaps East Germany was in the process of being groomed as the surrogate for Soviet military power in European affairs. But what of East German political loyalty to the USSR?

In Figure 4C we saw the extent to which overall USSR-Warsaw Pact relations were negatively affected by the Czechoslovakian Crisis. That

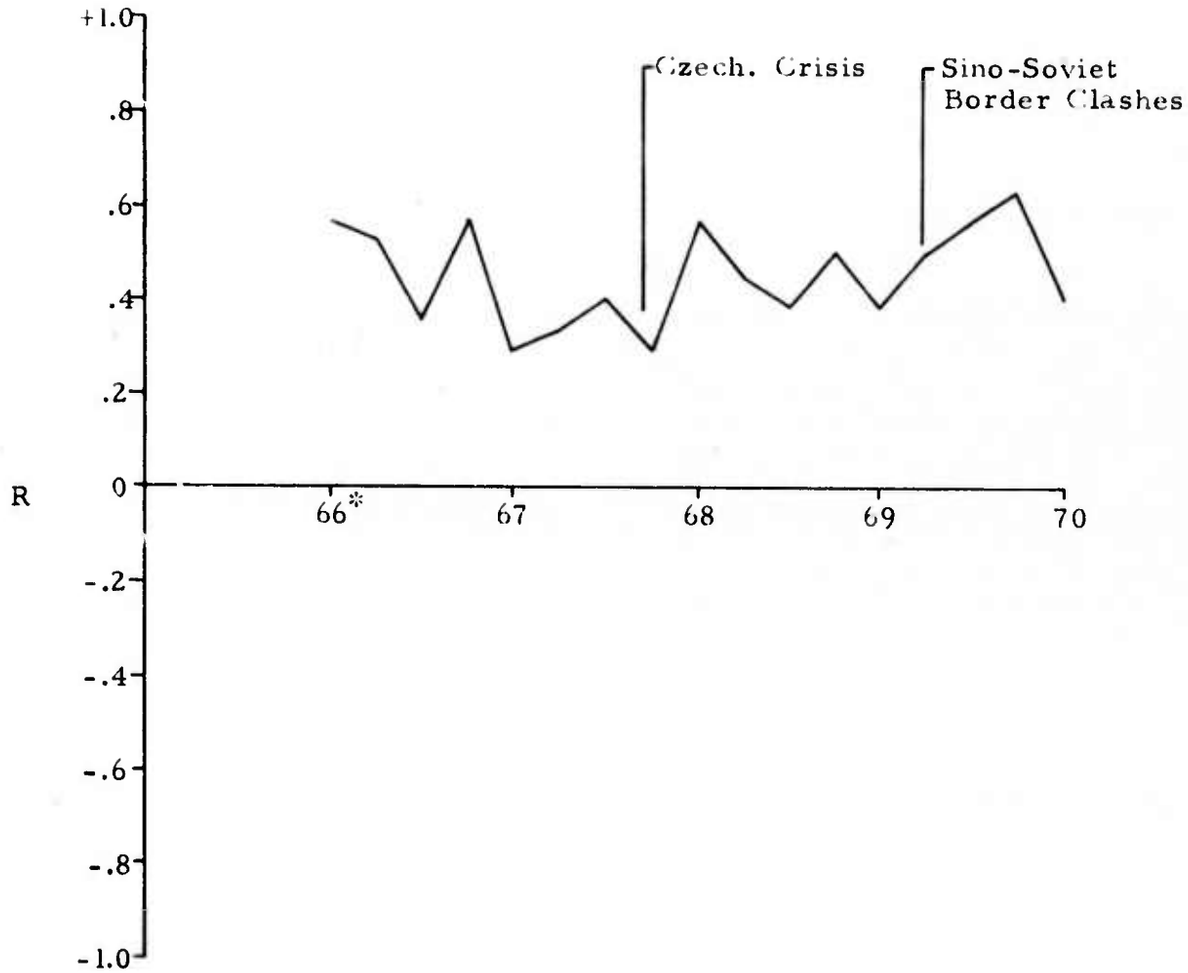
figure may now be contrasted with Figure 6 which displays relations between the USSR and East Germany. Here we see the minimal degree to which these relations were disturbed by that crisis. We see further the constancy of friendly relations between the pair over the entire period. We might choose, therefore, to interpret this as an illustration of East German political loyalty and reliability vis-a-vis Soviet interests and policy.

The scenario which was postulated at the outset may now be projected forward in time in a manner consistent with the inferences drawn from these few indicator displays:

> The buildup of military power in East Germany will permit the USSR to promote and accept some reduction of foreign military presence in Central Europe, including its own, and thereby permit it to continue to shift its military attention to its Eastern frontier. In the Soviet view, a politically reliable and militarily strong East Germany will provide a barrier to the growth of Western influence in East European affairs. East Germany, having been selected for this role, will become an increasingly important factor in future European and East-West affairs.

Together, the indicators cited offer consistent support to the scenario set forth above. That scenario may prove in time to be either accurate or inaccurate. What is important here is the idea that a family of international affairs indicators can contribute relevant information to the anticipation of future developments at a time when the art of anticipation can certainly benefit from the availability of new information tools.

Figure 6. USSR - East German Relations, 1966-1970



*The initial relations value is computed for a 12 month period ending Dec. 31, 1966. Subsequent values are computed each 3 months for the preceding 12 months.

FUTURE RESEARCH PLANS

The characteristics indicators described and illustrated in this paper will become a permanent part of the family of international affairs indicators that are maintained on a current and continuing basis by C.A.C.I. The potentials for international affairs analysis using the characteristics indicators, alone and in conjunction with the international indicators, should be extensive. The few illustrations presented in this report barely suggest the range of possible analyses and applications.

Specific areas on which further research is planned include:

1. Validation of selected characteristics indicators through seminar experiments,

2. Research on short-term forecasting based on:

   a. deriving interrelationships among characteristics and interactional indicators, and

   b. deriving characteristics profiles for country types and/or conflict types of national security interest, and systematically seeking the emergence of analogues to these types over time.

3. Research on "packaging" or displaying characteristics and interactional indicators in ways that enhance their utility.

APPENDIX A. ALPHABETICAL LISTING OF 82 COUNTRIES IN THE CHARACTERISTICS DATA FILE

Number*	Country	Code	Number	Country	Code
700	Afghanistan	AFG	731	Korea/North	KON
339	Albania	ALB	732	Korea/South	KOS
015	Algeria	ALG	812	Laos	LAO
160	Argentina	ARG	660	Lebanon	LEB
900	Australia	AUL	450	Liberia	LBR
305	Austria	AUS	620	Libya	LBY
211	Belgium	BEL	820	Malaysia	MAL
145	Bolivia	BOL	070	Mexico	MEX
140	Brazil	BRA	712	Mongolia	MON
355	Bulgaria	BUL	600	Morocco	MOR
755	Burma	BUR	210	Netherlands	NTH
811	Cambodia	CAM	920	New Zealand	NEW
020	Canada	CAN	093	Nicaragua	NIC
155	Chile	CHL	385	Norway	NOR
710	China/Peoples Rep.	CPR	770	Pakistan	PAK
713	China/Republic of	CHT	095	Panama	PAN
100	Columbia	COL	150	Paraguay	PAR
094	Costa Rica	COS	135	Peru	PER
040	Cuba	CUB	840	Philippines	PHI
315	Czechoslovakia	CZE	290	Poland	POL
390	Denmark	DEN	235	Portugal	POR
042	Dominican Repub.	DOM	360	Romania	ROM
130	Ecuador	ECU	670	Saudi Arabia	SAU
530	Ethiopia	ETH	560	South Africa	SAF
375	Finland	FIN	230	Spain	SPN
220	France	FRN	625	Sudan	SUD
265	Germ. /Dem. Rep.	GME	380	Sweden	SWD
255	Germ. /Fed. Rep.	GMW	225	Switzerland	SWZ
350	Greece	GRC	652	Syria	SYR
090	Guatemala	GUA	800	Thailand	TAI
041	Haiti	HAI	616	Tunisia	TUN
310	Hungary	HUN	640	Turkey	TUR
750	India	IND	365	USSR	USR
850	Indonesia	INS	651	United Arab Rep.	UAR
630	Iran	IRN	200	United Kingdom	UNK
645	Iraq	IRQ	002	United States	USA
666	Israel	ISR	165	Uruguay	URU
325	Italy	ITA	101	Venezuela	VEN
740	Japan	JAP	816	Vietnam/North	VTN
663	Jordan	JOR	817	Vietnam/South	VTS
501	Kenya	KEN	345	Yugoslavia	YUG

*These numbers are standard code numbers developed by Bruce M. Russett, J. David Singer, and Melvin Small, "National Political Units in the Twentieth Century, A Standardized List," American Political Science Review, 62 (September 1968), pp. 932-51, and are used in the WEIS sytem.