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INTERNATIONAL AFFAIRS INDICATORS FOR DEFENSE
DECISION-MAKING

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International Affairs Indicators
for Defense Decision-making

Theodore J. Rubin

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13. ABSTRACT

This research memorandum provides an overview of progress being
made in developing quantitative international affairs indicators for appli-
cation in Department of Defense decision-making. The goal of this
work is to build a selective yet comprehensive data base which will per-
mit the systematic description, in a quantitative form, of developments
occurring within and between foreign nations.

There are already in existence means for quantifying many phenomena
of concern to the Department of Defense. For instance, certain rough
measures are and have long been used to indicate the general military
capabilities of nations (e.g., force level counts). Still other measures
describe flows of trade and aid. In contrast, work on this project has
focused on the measurement of political phenomena occurring between
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certain of these phenomena in quantitative form.

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PREFACE

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There are already in existence means for quantifying many phenomena of concern to the Department of Defense. For instance, certain rough measures are and have long been used to indicate the general military capabilities of nations (e.g., force level counts). Still other measures describe flows of trade and aid. In contrast, work on this project has focused on the measurement of political phenomena occurring between foreign nations. The indicators described here attempt to represent certain of these phenomena in quantitative form.

Descriptions of related C.A.C.I. work on international affairs indicators are available in Development and Experimental Application of Quantitative International Affairs Indicators, Interim Technical Report No. 1, February 1972, and Dissemination and Evaluation of Quantitative International Affairs Indicators, Interim Technical Report No. 2, July 1972. A summary of significant developments between selected nations during the period 1966-1971 is also available in Quantitative Report on International Affairs, February 1972.

This research is supported by the Defense Advanced Research Projects Agency (ARPA), Human Resources Research Office. It should be of interest to all individuals and agencies concerned with the management of programs whose success or efficiency can be affected by the behavior of foreign nations.

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I. INTRODUCTION

Effective public decision-making has come to depend both on the measurement of basic decision variables and on the development of relevant decision models. Policy variables, particularly those which measure economic, social and political performance, have been among the slowest to yield to measurement. Further, the resulting measures, often termed "indicators," have only gradually acquired the trust and authoritativeness which are preconditions of widespread use. But everyone is aware of the extent to which such indicators, particularly economic indicators, are now used to monitor conditions, to assess alternative policies, to recall history, to anticipate the future, and to enhance communication among diverse groups. For instance, GNP is commonly used to indicate the size of a nation's economic output and is frequently used to make comparisons both between nations and over time for individual nations. The unemployment index and health statistics are similarly used and, in fact, have served as a basis for policy decisions even though these indicators only approximately measure the phenomena they purport to represent.

The existing inventory of domestic performance indicators is replete with well-known imperfections. In addition, most existing policy-decision models are relatively weak. Despite these structural and analytical limitations, however, performance indicators are in widespread use and are affecting domestic policy decisions. Their utility apparently outweighs their limitations, at least in certain situations.

National security decision-making in general, and defense decision-making in particular, rest primarily on decision variables which reflect international rather than domestic conditions. This paper describes

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an ongoing attempt to devise and test a set of indicators of international affairs. Such indicators might be expected to serve the defense and national security communities in approximately the same way that domestic performance indicators are currently serving other communities. For instance, indicators such as these might be used to monitor the magnitude and quality of international behavior over time and between nations, to summarize a historical record of great depth and breadth, to support or refute hypotheses about the likely consequences of alternative policies, and to serve as a basis for forecasting and communicating among diverse groups.

This program, supported by the Human Resources Research Office of the Defense Advanced Research Projects Agency (ARPA), is based on the premises that quantitative indicators of international affairs can be validly calculated using public source data, that the means of computing these indicators will remain valid when applied to classified data, and that a community of analysts, planners and policy makers exists which needs timely quantitative information on international affairs. Additional premises are that such indicators will be useful and serve existing needs if:

- They measure international affairs concepts which are important decision variables to potential users,

- The measures are understandable to a user community largely unfamiliar with the expression of international affairs in quantitative terms, and

- The measures can be made available on a continuing real-time basis in order to focus on international affairs of current operational interest to users.

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The program reported upon herein has been centered on three primary tasks:

- Development of a selected set of international affairs indicators,

- Computerized production of developed indicators, and

- User evaluation of the indicators.

II. INDICATOR DEVELOPMENT

Measures or indicators of international affairs have been developed by:

- Selecting an existing quantitative data file on international affairs from which to formulate measures,

- Relating international affairs concepts assembled from official public documents of the U.S. Government[1] to the quantitative data file, and

- Formulating and adjusting measures of the concepts from the data file until the measures seem to depict "reality."

A. THE DATA FILE

The World Event/Interaction Survey (WEIS)[2] behavioral data file was selected as the base upon which to build measures of international affairs concepts. This particular file was chosen for three reasons. First, it represents a current state-of-the-art data collection effort, more systematically performed and with better quality control than most contemporary collections. Second, the file is in machine-readable form permitting convenient access to the raw data. Third, the collection is current, permitting the evaluation of indicators formulated from it in terms of current international affairs.

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[1] E.g., Richard Nixon, U.S. Foreign Policy for the 1970's (February 25, 1971).

[2] The ARPA-supported WEIS Project was located at the University of Southern California and was under the direction of Professor Charles McClelland. The development and collection of the WEIS behavioral data file were an integral part of that project.

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The WEIS file is composed of a particular sample of behaviors which occur between countries. This sample is limited to non-routine behaviors between governments which are reported in the public media. Non-routine behaviors are defined as those which are newsworthy, i.e., such behaviors not part of the routine day-to-day business of international affairs. Routine international behaviors such as normal trade and diplomatic discourse, tourist exchanges, and mail flows are excluded from the WEIS sample. Specifically, reports of non-routine international behaviors appearing in the daily New York Times since January 1966 have been coded into 63 mutually exclusive event categories defined by the WEIS Project (see Table 1). The 63 event categories describe international behavior along a spectrum ranging from cooperation to conflict.

Occurrences of events have been compiled for over 150 governments, international organizations and non-governmental actors. Between 1966 and 1970, over 40,000 records were coded into the WEIS data file. Each record designates the actor country, the target country, the event category, and the date of the action. C.A.C.I. has extended the data collection beyond 1970 so that it remains current.

B. RELATING INTERNATIONAL AFFAIRS CONCEPTS TO WEIS EVENTS

A large number of international affairs concepts have been assembled from official U.S. Government documents. A few of these user concepts have been initially selected for measurement. These include seven basic concepts-- armed incidents, coercion, pressure, communication/consultation, support/agreement, reconciliation, and military withdrawal--plus three composite concepts--relations, policy style, and involvement. The former concepts are "basic" in that WEIS events

TABLE 1

THE SIXTY-THREE EVENT CATEGORIES

WITH WEIS CODES

WEIS Code	Event Categories
011	Surrender, yield to order, submit to arrest, etc.
012	Yield position, retreat, evacuate
013	Admit wrongdoing, retract statement
021	Explicit decline to comment
022	Comment on situation - pessimistic
023	Comment on situation - neutral
024	Comment on situation - optimistic
025	Explain policy or future position
031	Meet with, at neutral site, or send note
032	Visit, go to
033	Receive visit, host
041	Praise, hail, applaud, condolences
042	Endorse others' policy or position, give verbal support
051	Promise own policy support
052	Promise material support
053	Promise other future support action
054	Assure, reassure
061	Express regret, apologize
062	Give state invitation
063	Grant asylum
064	Grant privilege, diplomatic recognition, de facto relations, etc.
065	Suspend negative sanctions, truce
066	Release and/or return persons or property
071	Extend economic aid (for gift and/or loan)
072	Extend military assistance
073	Give other assistance
081	Make substantive agreement
082	Agree to future action or procedure, agree to meet, to negotiate
091	Ask for information
092	Ask for policy assistance
093	Ask for material assistance

TABLE 1 (Continued)

THE SIXTY-THREE EVENT CATEGORIES

WITH WEIS CODES

WEIS Code	Event Categories
094	Request action, call for
095	Entreat, plead, appeal to, help me
101	Offer proposal
102	Urge or suggest action or policy
111	Turn down proposal, reject protest demand, threat, etc.
112	Refuse, oppose, refuse to allow
121	Charge, criticize, blame, disapprove
122	Denounce, denigrate, abuse
131	Make complaint (not formal)
132	Make formal complaint or protest
141	Deny an accusation
142	Deny an attributed policy, action, role, or position
150	Issue order or command, insist, demand compliance, etc.
160	Give warning
171	Threat without specific negative sanctions
172	Threat with specific non-military negative sanctions
173	Threat with force specified
174	Ultimatum, threat with negative sanctions and time limit specified
181	Non-military demonstration, walk out on
182	Armed force mobilization, exercise and/or display
191	Cancel or postpone planned event
192	Reduce routine international activity, recall officials, etc.
194	Halt negotiations
195	Break diplomatic relations
201	Order personnel out of country
202	Expel organization or group
211	Seize position or possessions
212	Detain or arrest person(s)
221	Non-injury destructive act
222	Non-military injury-destruction
223	Military engagement

have been individually assigned to each concept for purposes of measurement. The latter concepts are "composite" in that their measures have been formulated using the seven basic concepts as building blocks. Of the basic concepts, the first three suggest various degrees of negative behavior, the fourth is a neutral form of behavior and the last three are various kinds of positive behavior.

The assignment of WEIS categories to each of the seven basic concepts resulted from matching WEIS event coding definitions and coding practices with implied or explicit concept definitions (see Table 2). No WEIS category was assigned to more than one basic concept. Some WEIS categories were not employed at all, being judged inappropriate for the measurement of any of the basic concepts. Explicit definitions for each of the basic and composite concepts were devised which reflect the assignment of WEIS categories (see Table 3).

Measures of the basic concepts defined in Table 2 are functions of event frequencies between pairs or groups of countries, [1] expressed as time series. Three measures are illustrated for each basic concept:

1. Simple event frequencies,

2. Event frequencies with a smoothing function to minimize short-term fluctuations which result from the arbitrary nature of a calendar-based time scale, and

3. Smoothed event frequencies systematically weighted to capture the relative importance of each class of interaction.

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[1] Henceforth in this report, the term "country" will refer either to individual countries (e.g., USA) or to aggregates of countries (e.g., South America).

TABLE 2

ASSIGNMENT OF WEIS CATEGORIES
TO BASIC CONCEPTS

Basic Concepts	WEIS Code	WEIS Categories
Military Incidents	223	Military engagement
Coercion	150	Issue order, insist on compliance
	160	Give warning
	171	Threat without specific negative sanctions
	172	Threat with specific non-military negative sanctions
	173	Threat with force specified
	174	Ultimatum, time limit specified
	182	Military mobilization, exercise, or display
	195	Break diplomatic relations
	201	Order personnel out of country
	202	Expel organization or group
	212	Detain or arrest persons
Pressure	111	Turn down proposal, reject protest, etc.
	112	Refuse, oppose, refuse to allow
	121	Charge, criticize, blame
	122	Denounce, denigrate, abuse
	131	Informal complaint
	132	Formal complaint or protest
	141	Deny an accusation
	142	Deny an attributed policy, action, or position
	191	Cancel or postpone planned event
	192	Reduce routine international activity
	193	Reduce or halt aid
	194	Halt negotiations

TABLE 2 (Continued)

ASSIGNMENT OF WEIS CATEGORIES

TO BASIC CONCEPTS

Basic Concepts	WEIS Code	WEIS Categories
Communication/ Consultation	025	Explain policy or future position
	031	Meet at neutral site, send note
	032	Visit, go to
	033	Receive visit, host
	062	Give state invitation
	091	Ask for information
	094	Request action, call for
	101	Offer proposal
	102	Urge or suggest action or policy
Support/Agreement	041	Praise, hail
	042	Endorse other policy or position
	051	Promise own policy support
	052	Promise material support
	053	Promise other future support
	054	Assure, reassure
	064	Grant privilege, diplomatic recognition, etc.
	071	Extend economic aid
	072	Extend military aid
	073	Extend other assistance
	081	Make substantive agreement
	082	Agree to future action or procedure
Reconciliation	013	Admit wrongdoing, retract statement
	061	Express regret, apologize
	065	Suspend negative sanctions, truce
	066	Release or return persons or property

TABLE 2 (Continued)

ASSIGNMENT OF WEIS CATEGORIES

TO BASIC CONCEPTS

Basic Concept	WEIS Code	WEIS Categories
Military Disengagement	011	Surrender, yield to order
	012	Yield position, retreat, evacuate
Codes Not Used for Indicator Construction (insufficiently defined or inappropriate)	021	Explicit decline to comment
	022*	Comment with a pessimistic tone
	023	Comment on situation-neutral, hope, express concern
	024*	Comment with an optimistic tone
	063	Grant asylum
	092	Ask for policy assistance, seek
	093	Ask for material assistance
	095	Entreat, plead for, appeal, help
	181	Non-military demonstration, walk out on, boycott
	211	Seize position or possessions
	221	Non-injury destructive act, bomb with no one hurt
	222	Military injury-destruction, bomb

*No longer used as codes in the ongoing collection

TABLE 3

DEFINITIONS OF BASIC AND COMPOSITE CONCEPTS

Concepts	Definitions
Basic Concepts	
1. Military Incidents	Small-scale, brief, and sporadic use of military force.
2. Coercion	Attempt to influence through implicit or explicit threat, or by employing strong sanctions.
3. Pressure	Attempt to influence through criticism, rejection, or accusation, or by invoking mild sanctions.
4. Communication and Consultation	Establish formal or informal contact and present respective positions.
5. Support and Agreement	Provide verbal or material support and/or reach agreement.
6. Reconciliation	Retract or amend hostile or negative statements or actions.
7. Military Disengagement	Cease military hostilities through withdrawal or surrender.

TABLE 3 (Continued)

DEFINITIONS OF BASIC AND COMPOSITE CONCEPTS

Concepts	Definitions
Composite Concepts	
1. Relations	Quality of behavior <u>between a pair of countries</u> implied by the mix of their positive, negative and neutral interactions in a given time period.
2. Policy Style	Quality of behavior <u>of one country toward another</u> implied by the mix of its positive, negative and neutral actions toward that country in a given time period.
3. Involvement	Total interaction <u>between a pair of countries</u> in a given time period, i.e., extent of official public attention.

C. SIMPLE EVENT FREQUENCIES

Figure 1 displays indicators of five of the basic concepts for the country pair, USSR-Czechoslovakia, expressed as monthly time series of simple event frequencies from 1966 through 1971. Pivotal events between these countries occurred in August 1968, when members of the Warsaw Pact intervened militarily in Czechoslovakia, and in April 1969, when Alexander Dubcek was replaced as the head of the Czechoslovakian Communist Party.

Figure 1 warrants several comments:

- Prior to 1968, there was virtually no non-routine interaction reported between this pair of nations.

- The August 1968 crisis was preceded by several months by the appearance of significant activity levels across four of the five indicators.

- Activity for all five indicators peaked with or immediately subsequent to the intervention, and these peaks occurred in a logical sequence.

- Following Dubcek's replacement, interaction between the USSR and Czechoslovakia returned to the pre-1968 state.

Three questions prompted by this illustration, which are also relevant to subsequent illustrations, are:

- Do these indicators, based on the WEIS sample, depict the subject international episode as it actually occurred?

- Would indicators such as these, if monitored on a current continuing basis, contribute to the "tracking" of international affairs in a crude but systematic way?
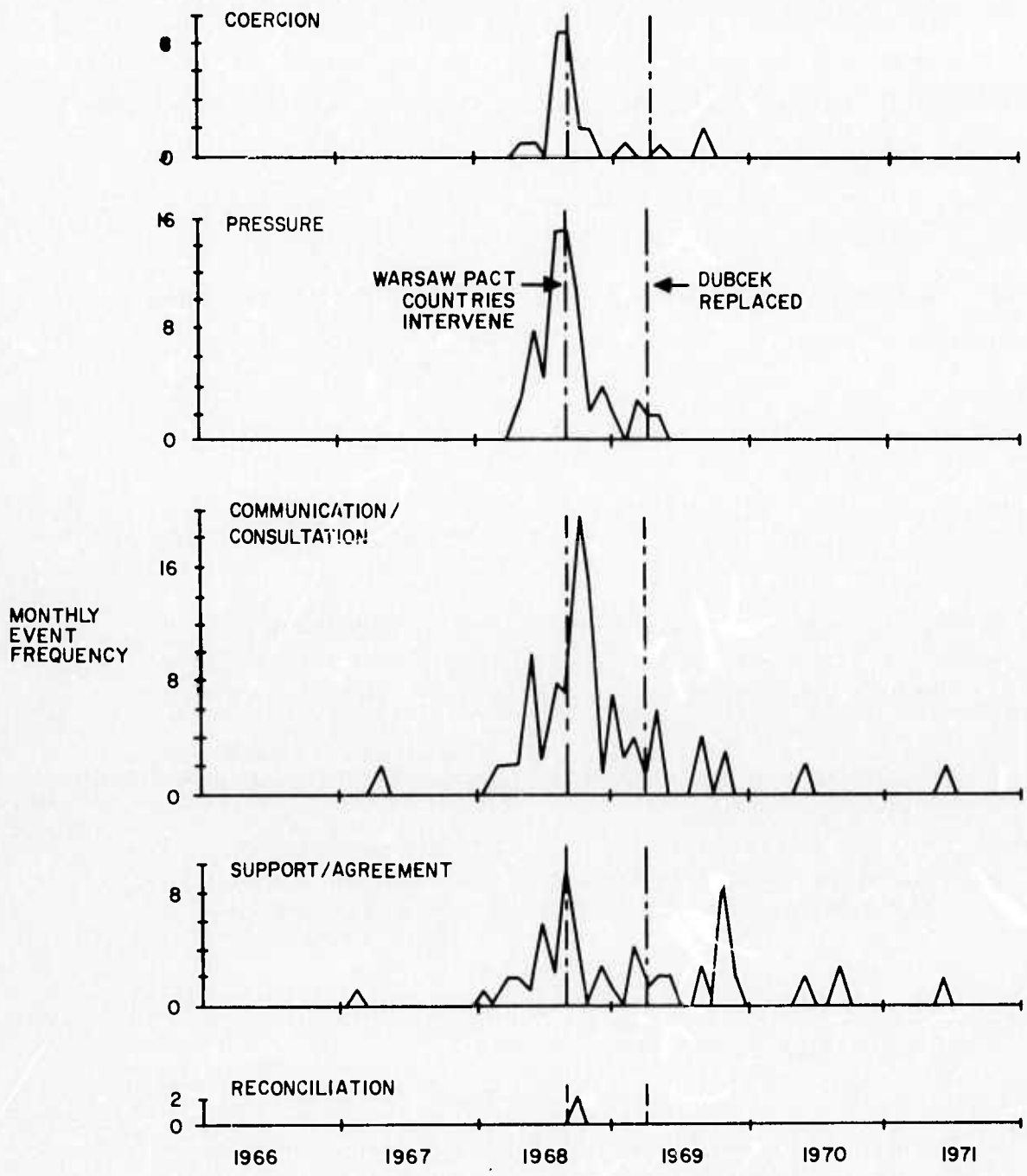
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Figure 1. Basic Interaction Indicators, 1966-1971

USSR - Czechoslovakia

(Event Frequencies)

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- Are signals of crisis or opportunity in these indicators evident early enough to serve a useful purpose?

D. SMOOTHING AND WEIGHTING

The occurrence of events reflected by these indicators is, of course, arbitrary with respect to the unit of time chosen for their display. For example, events associated with an episode of short duration might as easily occur across two calendar months as within a calendar month. To use a calendar-based time scale to depict such episodes can be unnecessarily misleading.

In Figure 2, a smoothing function is applied to the simple event frequencies of Figure 1 to offset this problem. The smoothing function extends the "life" of each event by spreading its impact over several consecutive months subsequent to its reported occurrence. An event is assigned its greatest value in the month of its occurrence and a diminishing value thereafter.[1] The effect, in Figure 2, is to retain the essential while reducing arbitrarily introduced short-term fluctuations.

Neither the simple event frequencies nor the smoothed frequencies reveal the relative importance of the five indicators of interaction between two countries. Importance is ascribed to indicators whose frequency levels between a pair are not characteristic of worldwide frequency levels. To determine the degree to which frequency levels are characteristic, a simple weighting function is used. This function revalues

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[1] This technique is reasonable from a theoretical standpoint. Non-routine events may well have a lingering but decaying value beyond 30-day (or smaller) time intervals.
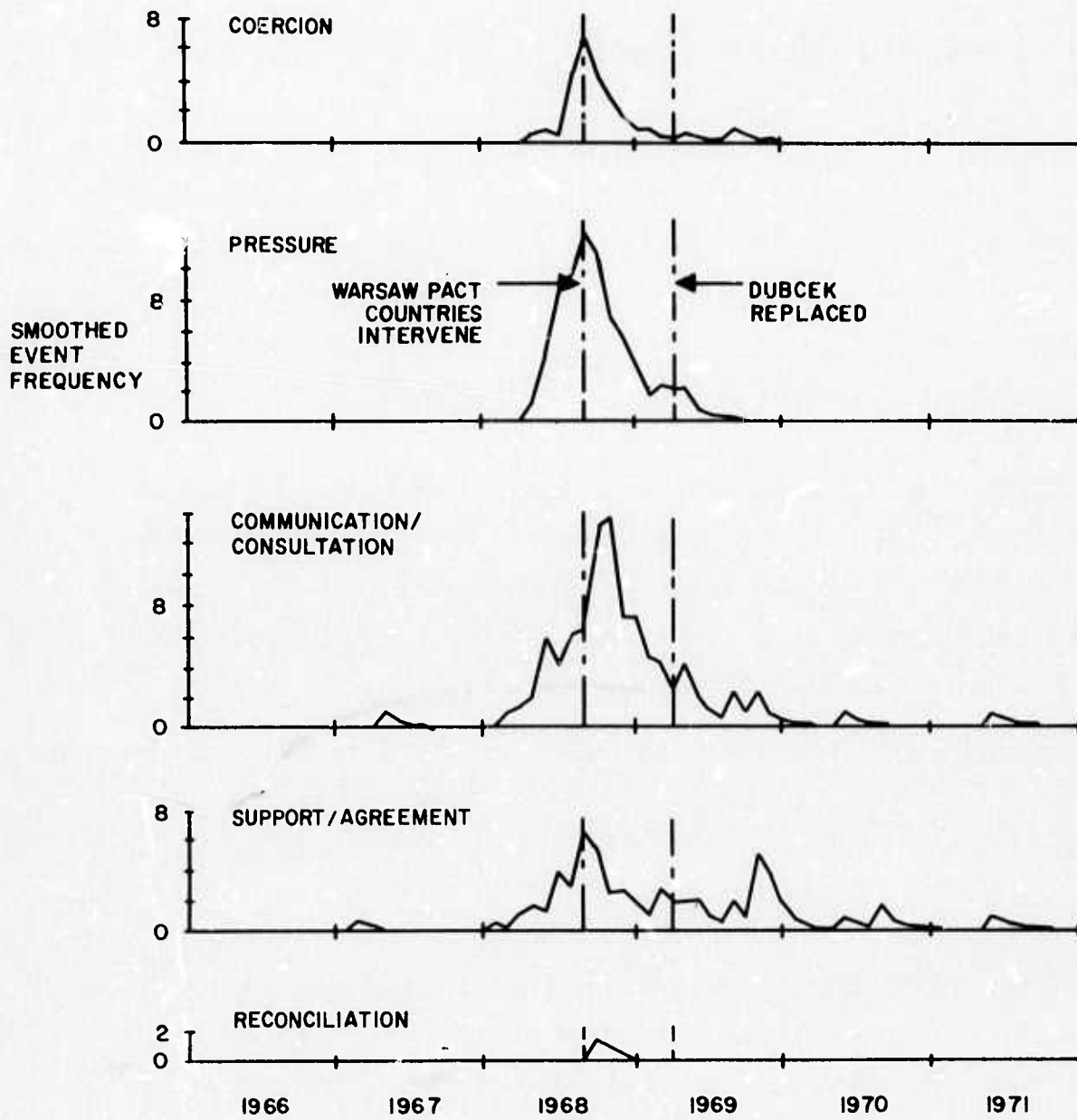
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Figure 2. Basic Interaction Indicators, 1966-1971

USSR - Czechoslovakia

(Event Frequencies with Smoothing Function)

each indicator by normalizing the event frequencies between a pair by the average event frequency which the pair directs to the world.

The effect on the USSR-Czechoslovakia case is illustrated in Figure 3. Note that it is the coercive and reconciliation behaviors which appear to be the most significant dimensions of the intervention episode. Specifically, coercive and reconciliation behaviors of this pair toward each other were relatively more numerous than were these behaviors by the pair toward the rest of the world.

E. MEASURES OF THE COMPOSITE CONCEPTS

The composite concepts are involvement, relations, and policy style. Each is measured so as to emphasize the particular aspect of international affairs that the concept represents.

1. Involvement. Involvement emphasizes the magnitude of interaction between countries. It is measured as the total number of actions (WEIS events) directed by a country pair toward one another, as reported in the data source (e.g., the sum of U.S. actions toward China plus Chinese actions toward the U.S.). This measure does not differentiate actions by quality (e.g., friendly or hostile) nor does it differentiate actions by importance.

Because the basic data represent only a sample of the universe of interaction among nations, the magnitudes representing involvement have no intrinsic meaning. Therefore, it is preferable to express involvement in relative rather than absolute terms, as in Table 4. This table displays the percentage distribution of U.S. worldwide involvement for the years 1966-1967 and 1970-1971. According to the data source, the
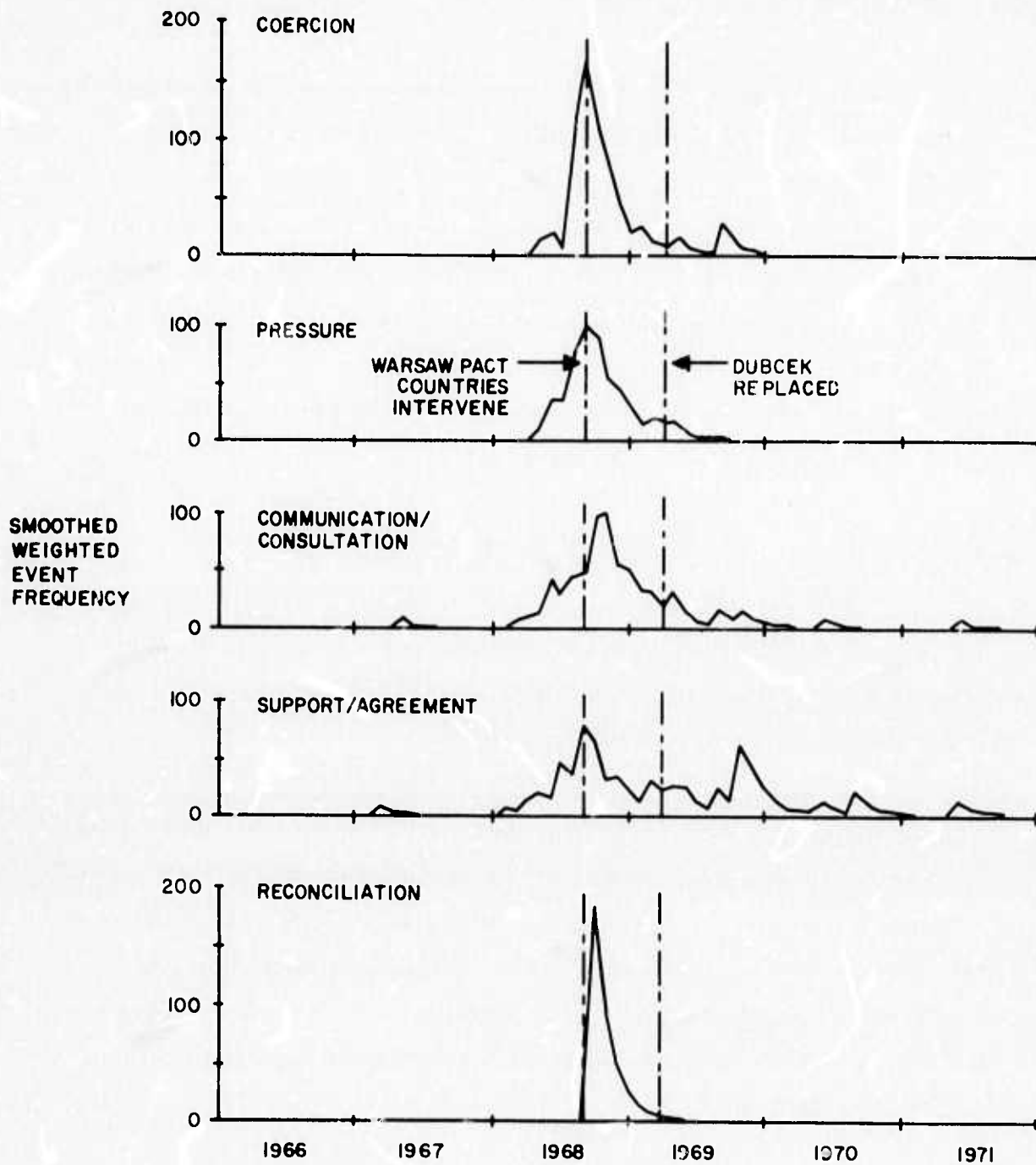
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Figure 3. Basic Interaction Indicators, 1966-1971

USSR - Czechoslovakia

(Weighted Smoothed Event Frequencies)

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TABLE 4

DISTRIBUTION OF US WORLDWIDE INVOLVEMENT

1966-1967 AND 1970-1971

Country or Region	Percentage of US Involvement	
	1966-1967	1970-1971
USSR	16	18
East and West Europe	25	18
China and Japan	8	10
All Other Asia	26	28
Latin America	7	7
Israel and the Arab States	10	16
All Other Africa	8	3
Total	100	100

TABLE 5

COMPARISON OF WORLDWIDE INVOLVEMENT

OF THE US AND USSR, 1970-1971

Country or Region	Percentage of Involvement	
	US	USSR
US	--	34
USSR	18	--
East and West Europe	18	27
China and Japan	10	8
All Other Asia	28	11
Latin America	7	3
Israel and the Arab States	16	14
All Other Africa	3	3
Total	100	100

relative attention paid each country or region in the conduct of U.S.
foreign affairs may be inferred from this table. To the extent that
changes appear across time in the distributions (i.e., from 1966-1967
to 1970-1971), a change in the pattern of U.S. involvement may be in-
ferred. For example, the table suggests that U.S. concern with
European affairs diminished relative to other U.S. concerns from the
earlier to the later time period, while attention to Southeast Asia con-
tinued to predominate and the Middle East gained in importance.

Table 5 compares current (1970-1971) U.S. and USSR patterns of in-
volvement. According to the table, USSR attention to foreign affairs
is focused primarily on the U.S. and Europe, and secondarily on the
Middle East, Southeast Asia, and China and Japan.

Involvement can be measured in finer detail along three dimensions.
First, worldwide involvement can be broken down by individual countries
rather than being aggregated as in Tables 4 and 5. Second, involve-
ment patterns may be disaggregated into finer units of time and be
viewed as time series. Third, involvement may be differentiated by
quality, that is, the distributions of a nation's friendly, neutral, or
hostile involvement may be separately portrayed.

2. Relations. Relations is perhaps the single most widely used con-
cept in the foreign affairs community. It emphasizes the quality,
rather than the magnitude, of interaction between countries. Relations,
so defined, implies the mix of positive (friendly), negative (unfriendly)
and neutral actions of a pair toward one another.

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Relations is measured by the function:

$$R = \frac{p - n}{p + n + \frac{ne}{2}}$$

Where:

R = Relations

p = total positive actions reported between a pair

n = total negative actions reported between a pair

ne = total neutral actions reported (neutral actions are presently accorded only one-half weight in measuring relations)

The values of this relations function range from +1.0 to -1.0. A plus value of R indicates that positive actions exceed negative actions for a country pair; a minus value of R indicates the opposite. The magnitude of the value of R indicates the degree to which relations between a pair are positive or negative. High plus values imply friendly or supportive relations. High minus values imply hostile relations. Values near zero imply neutral relations.

Figure 4 illustrates time series of relations among the US, USSR and CPR in graphical form. Values for relations in the figure are computed at the end of each calendar quarter for the previous twelve months so as to provide continuity in the values. For example, the calculation for calendar year 1966 is the first calculation for each curve and is aligned with "67" on the abscissa. The second calculation covers the twelve months ending March 31, 1967, and so on.

A sample of key episodes in world affairs, to which response in relations between these pairs might be expected, is superimposed on the figure at
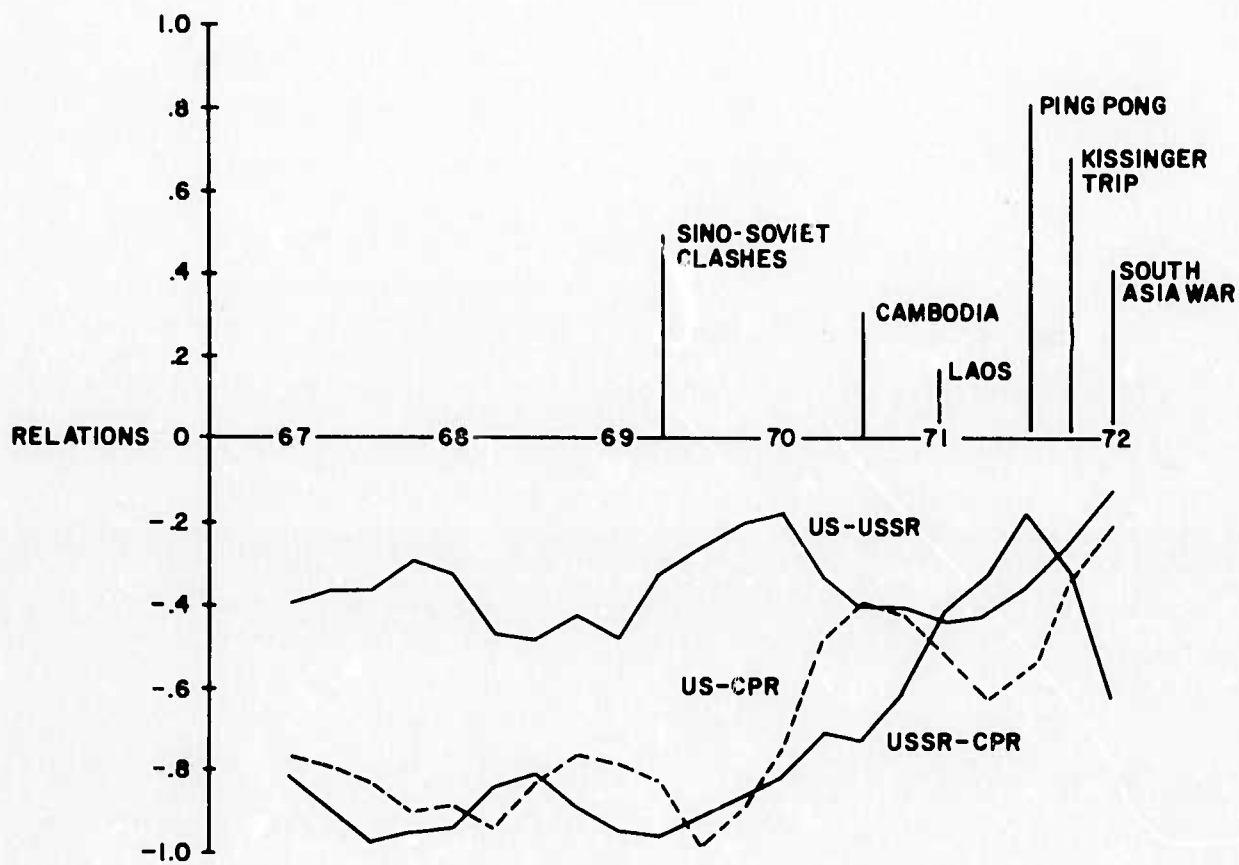
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Figure 4. US-USSR-CPR Relations, 1966-1971

each calendar quarter of occurrence (e.g., Sino-Soviet clashes during the first quarter of 1969). In general, relations between pairs tend to respond as expected to such major episodes. For example, the improvement in relations between the U.S. and China following the Sino-Soviet clashes and the temperate China policy of the Nixon Administration was temporarily reversed by the U.S. involvement in Cambodia and Laos in 1970; the move toward better relations subsequently resumed with the U.S. and Chinese initiatives during 1971. The reader may wish to test this thesis in terms of other episodes which he considers pivotal.

In more general terms, the dominant characteristic of US-USSR-CPR relations in Figure 4 is their stability from 1966 through 1968 (relatively small fluctuation) followed by their subsequent instability (relatively large fluctuation). This observation suggests that a basic reorganization in international affairs is underway.

3. Policy Style. Like relations, the concept policy style emphasizes quality rather than magnitude in international affairs. However, while relations expresses the quality of interaction between a pair of countries, policy style expresses the quality of the actions of one country toward another. That is, policy style implies the mix of positive, negative and neutral actions directed by one country toward another.

Policy style is measured by the function:

$$S = \frac{p - n}{p + n + \frac{ne}{2}}$$

Where:

S = Policy Style

p = total positive actions reported

n = total negative actions reported

ne = total neutral actions reported (neutral actions are currently accorded only one-half weight in measuring policy style)

The values of this policy style function range from +1.0 to -1.0. A plus value of S indicates that positive actions exceed negative actions; a minus value of S indicates the opposite. The magnitude of the value of S indicates the degree to which the policy style of a country toward another is positive or negative. High plus values imply a friendly or supportive style. High minus values imply a hostile style. Values near zero imply a neutral style.

Figure 5 depicts the opposing policy styles of the US, USSR and CPR. Figure 5A displays the asymmetrical styles of the U.S. and China toward each other. The dominant feature in this figure is the reversal of U.S.-China policy at the beginning of the Nixon Administration. The new U.S. signals directed toward China plus relevant U.S. policy elsewhere elicit a gradual but noticeable improvement in China's policy style toward the U.S.

Figure 5B displays the opposing styles of the U.S. and USSR toward each other. These styles are generally parallel except following the Sino-Soviet border clashes when Soviet style toward the U.S. softened temporarily. Figure 5C displays the symmetry, or the give-and-take, of USSR and China styles toward each other.
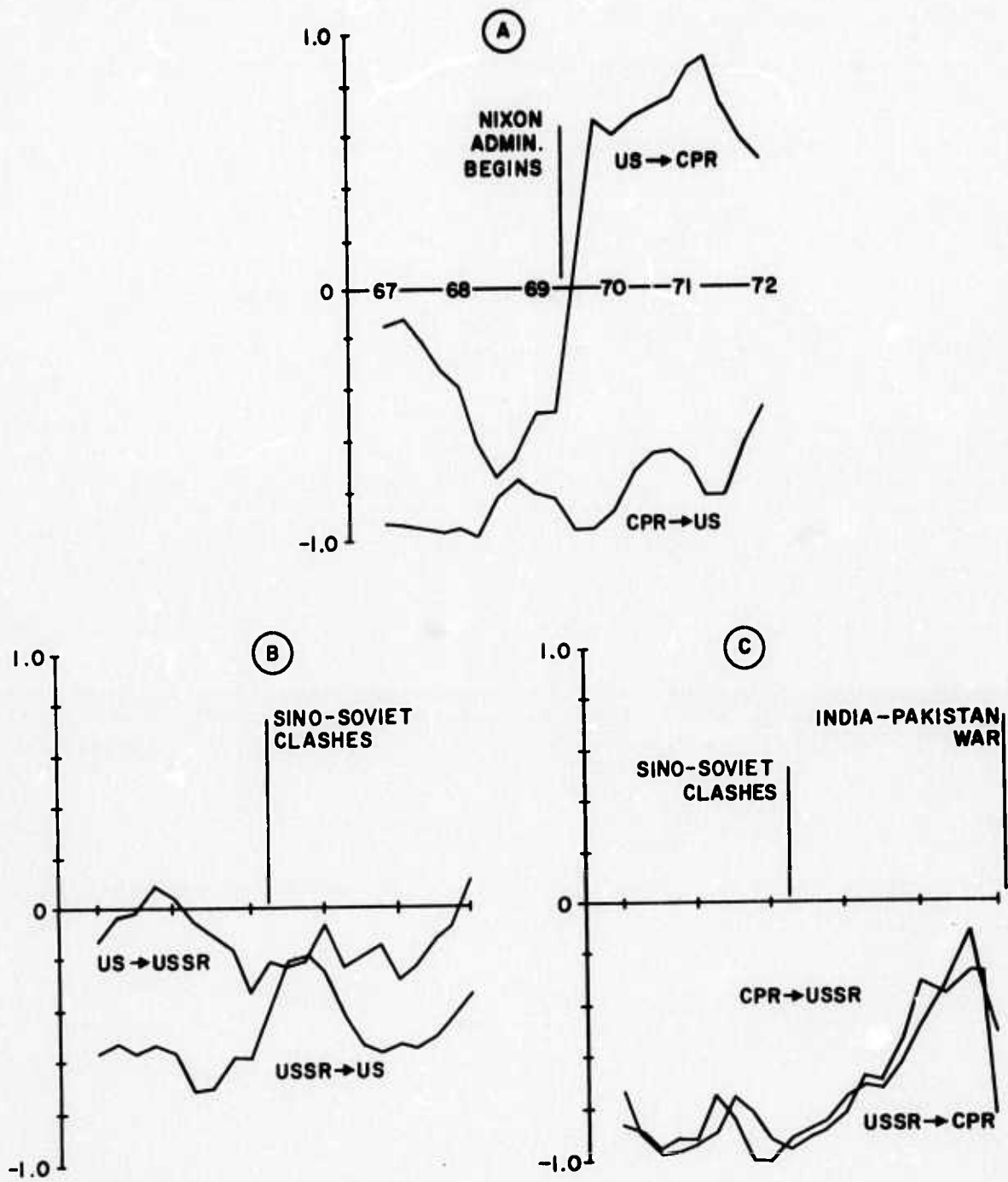
Figure 5. US-USSR-CPR Policy Styles, 1966-1971

III. COMPUTERIZATION

In the process of developing international affairs indicators, considerable progress has been made in computerizing the storage, retrieval and manipulation of raw WEIS event data. Coupled with additional computer programs designed to calculate and display indicator values, considerable capability now exists for producing current indicator values in a timely fashion.

The raw WEIS data, it will be recalled, are in the form of a chronology beginning January 1966. Each record in the chronology has four dimensions: actor, target, coded WEIS event, and date. A flexible retrieval program designed by the WEIS Project and designated WEISUM II permits the retrieval of data in matrix form along any two of these dimensions, and permits control of the other two dimensions. For example, it is possible to retrieve data conforming to instructions such as:

1. Display total monthly accusations and threats directed by NATO countries to Warsaw Pact countries during 1971, or

2. Display total positive events directed by the U.S. to African countries each calendar quarter since 1966, and so on.

It is important to note that data from each of the dimensions may be retrieved at virtually any level of aggregation. That is, data may be specified for single countries or groups of countries as actors or targets; events may be specified as single event types

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(of the 63 collected) or aggregates of events; and time may be specified as any aggregate of months.

For purposes of indicator development, the data have been retrieved as matrices of time in months vs. the event groups which constitute the basic interaction concepts for over 200 actor-target pairs representing different country aggregations. The data retrieved in the above format constitute the Basic Data File of the indicator development program.

Computer programs which operate directly on the Basic Data File to compute values for the indicators discussed in this paper have been designed during the course of development. These programs are interactive and are designed to be operated from time-sharing terminals. One such program computes and displays values of the indicators' relations and involvement, along with selected values of their constituent elements. An example of the output is displayed in Figure 6. The instruction "/XEQ VARPR" makes both the indicator computation program and the complete Basic Data File available to the operator, who then implements several options:

- He may select up to 10 dyads[1] for simultaneous computation (in the example, 1 dyad is specified).

- He must identify the dyads he selects by their Basic Data File code designation (046 identifies the pair US-UK).

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[1] The term "dyad" is synonymous with country pair for the purposes of this paper.

- He must select from among five alternative time
  intervals for calculation purposes (1 = annual,
  2 = semi-annual, 3 = quarterly, etc.).

- He may select the month from which calculation
  is to be initiated (01 refers to January 1966).

The resulting output in Figure 6 displays annually for US-UK the following data and calculations:

- MIL - number of military incidents

- NEGATIVE - total negative interaction

- NEUT - total neutral interaction

- POSITIVE - total positive interaction

- INVOLVEMENT

- RELATIONS

```
/XEQ VARPR

HOW MANY DYADS?   2-DIGIT NUMBER
>01
WHICH DYADS?   3-DIGIT NUMBERS
>046
TIME INTERVALS?
>1
START AT WHAT MONTH?   2-DIGIT NUMBER
>01
```

OPTIONS
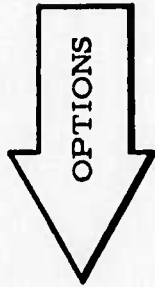
DYAD 46   USA - UK

YEAR	MIL	NEGATIVE	NEUT	POSITIVE	INVOLVEMENT	RELATIONS
1966	0	3	25	25	53	0.54
1967	0	3	23	13	39	0.36
1968	0	5	16	11	32	0.25
1969	0	1	11	7	19	0.44
1970	0	4	34	13	51	0.26
1971	0	2	18	12	32	0.43
TOTAL	0	18	127	81	226	0.39

Figure 6. Indicator Computation Program Output

IV. USER EVALUATION

A. THE SEMINAR PROGRAM

User evaluation of the international affairs indicators is being accomplished through a half-day seminar conducted at user sites for groups of ten to fifteen participants. The seminar includes a detailed presentation and discussion of indicator development and computerization, an experiment designed to provide objective data on indicator acceptability and usefulness, a questionnaire designed to provide subjective evaluative data, and a summary presentation of prior experimental results.

At the time of this writing, six seminars, involving 69 participants, have been completed. The agencies involved were:

- Foreign Service Institute, U.S. Department of State
- U.S. Army War College
- U.S. Naval Postgraduate School
- National Intelligence Projections and Evaluation (NIPE) Staff, Director of Central Intelligence
- U.S. Army Deputy Chief of Staff for Military Operations
- OSD (Systems Analysis) and OSD (International Security Affairs)

Additional seminars will be scheduled as the program proceeds.

B. EXPERIMENTAL DESIGN

In the experiment, participants are asked to provide their estimates (along a scale of +1.0 to -1.0) of past (1966/1967), present (1970/1971)

and future (1975) relations between twenty specified pairs of countries. For ten of the twenty specified pairs, *the* values of the relations indicator are provided for the past and present period, along with graphical displays (similar to Figure 4) illustrating the course of the relations indicator over the intervening period. For the other ten specified pairs, all values of the relations indicator are withheld. Participants are instructed to give their own estimates of relations since the use of the indicator values provided is discretionary. As an additional experimental task, participants are asked to record their reasons when they view a significant change in the future relations between a pair of nations.

This experimental design provides objective data relative to several evaluative and developmental goals:

- By measuring differences between indicator and estimated values, it is possible to assess the extent of disagreement between the two. Systematic differences across all cases (pairs of countries) may provide clues to desirable modifications of the indicators. Differences confined to isolated cases may identify aberrant cases which require further analysis.

- By measuring differences between cases where indicator values are provided and cases where they are withheld, it is possible to assess the degree to which the indicators were used in the experimental setting.

- By accumulating an inventory of rationales for individual forecasts of significant change, it may be possible to deduce a body of "operational" theory which can be empirically tested for its predictive value.

C. EXPERIMENTAL FINDINGS

A few positive, but tentative, experimental findings from the six completed seminars follow. These findings must be considered tentative

until a broader and deeper evaluation can be completed. However, results to date seem to show that these indicators correspond well with informed but qualitative impressions of "relations."

In Table 6, average disagreement between estimated and indicator values is summarized. The median of the estimated values is employed to reflect the consensus of the 69 participants with regard to relations between each country pair. Disagreement, as measured in Table 6, is the average across cases of the absolute differences between the median estimated values and indicator values.[1] The table displays average disagreement for the past and present and for the change from past to present. Cases are differentiated on the basis of the availability of the indicator values.

The table reveals that average disagreement was considerably smaller when indicator values were provided than when these values were withheld. This finding is consistent for the past, the present and for the change from past to present. Second, disagreement in the past is greater than in the present when indicator values are withheld. This suggests memory decay which is not evident when indicator values are provided. These summary findings suggest that, when available:

- The indicators were used,
- Their values were acceptable,
- They reduced disagreement generally, and
- They provided a measurable aid to memory.

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[1] This evaluative measure and all subsequent ones may be interpreted in terms of units of the relations scale of +1.0 to -1.0. For example, disagreement of .10 is equal to $\pm.10$ on the relations scale, which in turn is equal to $\pm 5\%$ of the range of the relations scale.

TABLE 6

AVERAGE DISAGREEMENT BETWEEN MEDIAN
ESTIMATES AND INDICATOR VALUES

	Past	Present	Change From Past To Present
Indicator Values Provided	.07	.08	.07
Indicator Values Withheld	.33	.25	.24

TABLE 7

AVERAGE DISPERSION OF INDIVIDUAL
ESTIMATES ABOUT THE MEDIAN ESTIMATE

	Past	Present	Future
Indicator Values Provided	.12	.13	.17
Indicator Values Withheld	.19	.19	.19

A less favorable alternative interpretation of these and subsequent findings is that participants "anchor"to the indicator values provided (and would to any alternative values) for such reasons as their unfamiliarity with quantitative scaling procedures, their unfamiliarity with the subject matter, pressure they feel in the experimental setting, etc. Later experiments will attempt to differentiate such possible anchoring effects from effects reflecting the credibility and utility of the indicators.

Table 7 summarizes the average dispersion of individual estimates about the group consensus. Here, disagreement is the average dispersion of individual estimates from the median estimate. Results are summarized for past, present, and future. Cases are again differentiated on the basis of the availability of relations indicator values.

This table reveals less dispersion when past and present indicator values are provided than when they are withheld. In the future time period, indicator values are, in effect, "withheld" for all cases. Average disagreement dispersion of future individual estimates about the future median estimate reflects this condition. These findings suggest that when available, the indicators tend to increase group consensus.

As the seminar program continues, with attendant increases in respondent sample sizes, and with controls introduced to offset any current biases in case selection, it should be possible to assess the validity of these tentative findings and, thereby, to objectively measure the prospective value of an international affairs indicator system to the national security community.

V. FUTURE RESEARCH PLANS

Comments and suggestions being made by members of the national security community are serving as a guide to further developmental work. One recurrent suggestion is that different sources and, in particular, intelligence sources should be used to generate the behavioral data base. To address this issue, experiments will be conducted in the near future using selected current intelligence sources. Another suggestion is that the events be associated with some prominent issues of concern to the national security community. Drawing upon some previous C.A.C.I. experience with issue-coded events, a modified coding system is being developed and will be used to assess the usefulness of this type of modification.[1]

This same type of approach to measuring behavior can be applied within a country and, since internal affairs in foreign nations can often have a significant effect on many national security programs, some experimental coding of reported foreign internal interactions will also be undertaken.

These modifications and others similar to these should produce, in the near to mid-term future, a set of summary descriptions of international and intranational behavior which can be of significant utility to the national security community in monitoring foreign conditions, in assessing alternative policies, in recalling history, in anticipating the future and in enhancing communication on international behavior.

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[1] The International and Domestic Event Coding System (INDECS) is now being applied to selected Southeast Asian sources to create an event file in support of analyses being conducted for the U.S. Army Deputy Chief of Staff for Operations (Psychological Warfare Branch).

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