

Event Data in Foreign Policy Analysis

Philip A. Schrodt
Dept. of Political Science
University of Kansas
Blake Hall
Lawrence, KS 66045
913-864-3523 Fax: 913-864-5208
Email: p-schrodt@ukans.edu

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Introduction

Foreign policy analysis developed at about the same time as the behavioral approach in political science. The objective of the behavioralists was to study political behavior using systematically measured variables, statistical techniques, and unambiguously stated hypotheses. In some areas of political science, the behavioralist studies used measurement techniques that had been developed earlier. For example, researchers attempting to model elections found that the traditional questions asked of potential voters in survey research—party affiliation, whether they had voted before, who they were planning to vote for and so forth—provided a useful foundation for their studies. While the statistical methodologies and survey methods used in contemporary voting research are substantially more sophisticated than the voting surveys of the 1920s and 1930s, the basic measurement instrument—the public opinion survey—is the same.

No equivalent data existed in the field of foreign policy analysis. Traditional studies of foreign policy primarily used narrative sources such as documents, histories, and memoirs and there was no way to directly analyze these in a statistical framework. This disjuncture necessitated the development of new methods for generating data. A variety of these methods have been discussed in the other chapters of this volume; this chapter will focus on one of the most commonly used measurement techniques, event data.

The basis of many studies of foreign policy is the fundamental question of "who did what to whom?" For example, during the Nixon administration (1968-1974), the United States and the Soviet Union had a relaxation of diplomatic tensions known as the *détente* period. This was reflected in a variety of foreign policy actions, including arms control agreements, a decrease in hostile rhetoric, increased trade, and increased cooperation in resolving disputes. A decision maker living during this period would have a general perception that the hostility between the two superpowers had decreased. However, this perception would be based on a general pattern of cooperative interaction, rather than on a single incident.

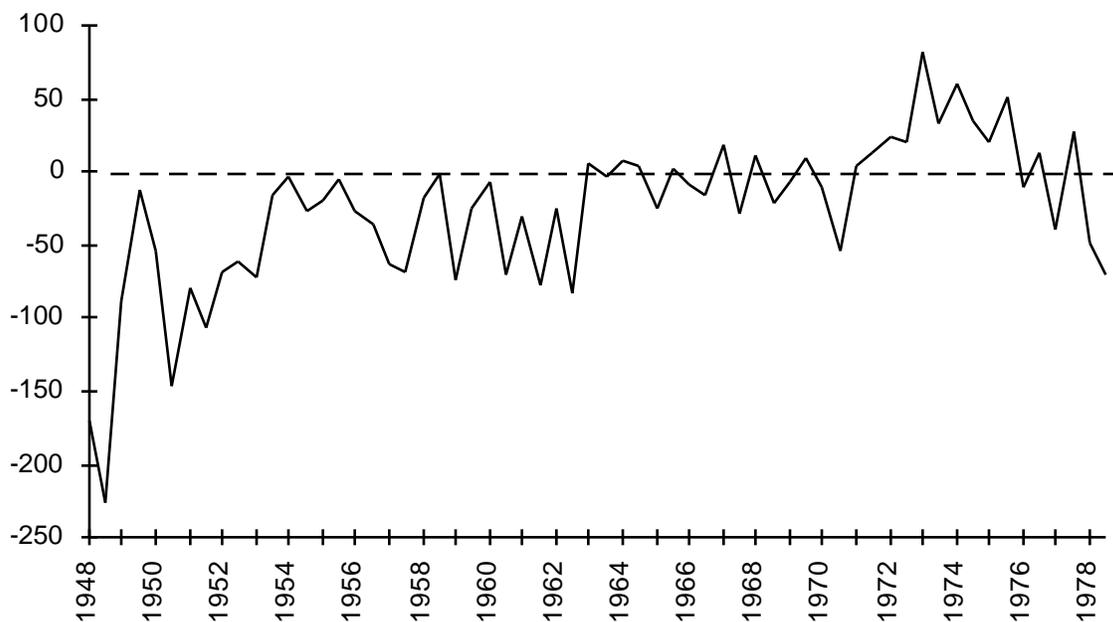
Event data are a formal method of measuring the phenomena that contribute to foreign policy perceptions. Event data are generated by examining thousands of newspaper reports on the day to day interactions of nation-states and assigning each reported interaction a numerical score or a categorical code. For example, if two countries sign a trade agreement, that interaction might be assigned a numerical score of +5, whereas if the two countries broke off diplomatic relations, that would be assigned a numerical score of -8. When these reports are averaged over time, they provide a rough indication of the level of cooperation and conflict between the two states.

Figure 1 shows the actions that the United States directed towards the Soviet Union for the period 1948-1978 as measured by the Conflict and Peace Data Bank (COPDAB) event data set collected by the late Edward Azar (1980,1982)¹. In the COPDAB coding scheme, negative numbers indicate

conflictual behavior; positive numbers indicate cooperation. COPDAB is based on *The New York Times* and a variety of regional newspaper sources; the data cover the period 1948-1978.

The COPDAB time series shows three general periods. The early Cold War (1948-1962) is characterized by uniformly negative relations, though these are more stable in the late 1950's than in the early 1950's. A partial "thaw" occurs in 1962-1970 following the Cuban Missile Crisis, with the relationship being neutral. Finally, the 1970-1978 period shows the rise and fall of the *détente* policy. Other event data sets covering the 1980s record the "new Cold War" of the early Reagan period followed by the improved relations that occur when Gorbachev comes to power in the USSR.²

Figure 1
USA Actions Towards USSR, 1948-1978



The event data record of USA-USSR interactions correspond closely to the patterns one would expect from an historical study. Moreover, the event data can also be used to fine-tune that chronology. For example, while Nixon clearly intended to implement a *détente* policy from the beginning of his administration in 1969, there was continued disagreement between the USA and USSR over the US involvement in Vietnam, the 1968 Soviet invasion of Czechoslovakia and other issues, so the interaction pattern is not actually positive until 1971. Positive interactions peak about the time of Nixon's resignation in 1974; the event data scores then decline during the two years of the Ford administration and return to post-Cuban Missile Crisis levels by 1976.

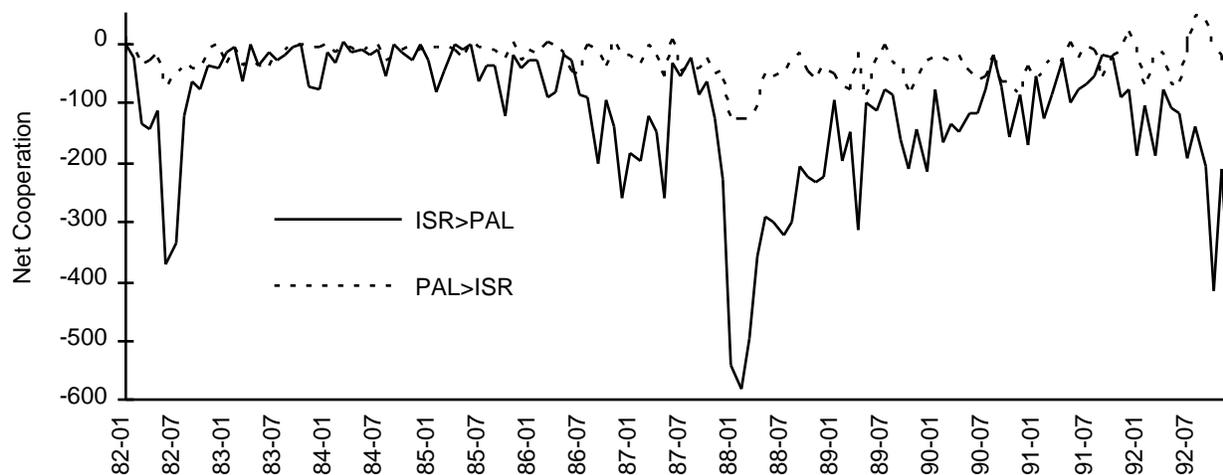
Figure 2 shows another example of the use of event data to chart the evolution of a complex international interaction, the Palestinian *intifada* (uprising) that began in December 1987.³ This chart is based on the coding of news stories on Israeli-Palestinian reported by the Reuters international news

agency. These reports were automatically coded by a specialized computer program into the World Events Interaction Survey (WEIS) event data categories developed by Charles McClelland (1976). The categorical WEIS events were then converted to a monthly numerical score using a scale devised by Goldstein (1992); as in Figure 1, negative scores indicate conflict and positive scores cooperation.

This time series shows the pattern of interactions—largely uses of force—in considerable detail. The initial increase in conflictual activity in 1982-83 corresponds to Israel's invasion of Lebanon, which was initially directed against Palestine Liberation Organization forces. The invasion is followed by a period of five years of relative quiet, though a separate series of event data on Israel's interactions with *Lebanon* during this period shows a great deal of conflict as opposition to Israeli forces shifts from the PLO to various Lebanese groups. The *intifada* begins abruptly in December 1987 and then gradually declines over the next five years, though there is another upsurge in violence following the election of a Labor government in Israel in the summer of 1992.

As with the case of the USA-USSR interactions, this time series gives a more exact measure of the patterns of events over time. For example, while the *intifada* follows a lull in conflict during the summer of 1987, the event data also show a general increase in conflict beginning about 18 months earlier. This increase may have been a precursor to the larger uprising.

Figure 2
Israel-Palestinian interactions, 1982-1992



As these two figures illustrate, event data can be used to summarize the overall relationship between two countries over time. The patterns shown by event data usually correspond to the narrative summaries of the interactions found in historical sources, but unlike narrative accounts, event data can be subjected to statistical analysis. As a consequence, event data are frequently used to study foreign policy outcomes and some characteristics of the international environment within which foreign policy decisions occur.

Creating Event Data

The creation of event data is basically a process *content analysis* (see Krippendorff 1980; Weber 1990) and involves three steps. First, a source or sources of news about political interactions is identified. This could be an internationally-oriented newspaper such as *The New York Times*, a set of regional newspapers and newsmagazines, a news summary such as *Facts on File* or *Deadline Data on World Affairs*, or a newswire service such as Reuters or the Associated Press. As will be discussed below, the choice of the event source can have a substantial effect on the number and type of events reported.

Second, a coding system is developed, or a researcher may decide to use an existing coding system such as WEIS or COPDAB. The coding system specifies what types of political interactions constitute an "event," identifies the political actors that will be coded (for example, whether nonstate actors such as international organizations and guerrilla movements will be included in the data set), specifies the categories of events and their codes, and specifies any information to be coded in addition to the basic event. For example, the COPDAB data set codes a general "issue area"—whether an action is primarily military, economic, diplomatic or one of five other types of relationship. WEIS, in contrast, codes for specific "issue arenas" such as the Vietnam War, Arab-Israeli conflict, and SALT negotiations.

In a project using human coders, these coding rules are collected into a manual used for training coders; these manuals are often fifty or more pages in length and deal with a variety of contingencies that coders may encounter. The third stage involves training coders so that a news story will be assigned the same codes irrespective of the individual coding it. Coders in event data projects generated in universities are typically graduate students or advanced undergraduates in political science. The training stage is frequently quite time consuming but with sufficient training, most projects train coders to the point where two coders will assign the same code to a news report in 85% to 90% of the cases (see Burgess and Lawton 1972). In a project dealing with a relatively short period of time—for example the 1990-1991 Gulf crisis—a single researcher may do all of the coding in insure that a single coding standard is used. In machine coding system (see Gerner et al. 1994), a computer program must be provided with the appropriate vocabulary to identify actors and events;

In a machine-coding project, coding rules are implemented in a computer program, usually using extensive dictionaries which identify actors and events and then associate these with specific codes (see Lehnert and Sundheim 1991, Gerner et al 1994). These dictionaries are typically developed by coding a large number of test sentences from the actual data and adding the appropriate vocabulary when the machines makes an error.

When these three tasks have been completed, coding can be done. Generating a large human-coded data set such as WEIS or COPDAB takes a number of years, during which time intercoder reliability must be maintained despite the turnover in the coders. Machine-coding is much faster—a

computer program can code hundreds of events per minute—but machine coding is restricted to simple event categories and cannot extract more complicated types of information from a story.

Table 1
Reuters Chronology of 1990 Iraq-Kuwait Crisis

- July 17, 1990: RESURGENT IRAQ SENDS SHOCK WAVES THROUGH GULF ARAB STATES**
Iraq President Saddam Hussein launched an attack on Kuwait and the United Arab Emirates (UAE) Tuesday, charging they had conspired with the United States to depress world oil prices through overproduction.
- July 23, 1990: IRAQ STEPS UP GULF CRISIS WITH ATTACK ON KUWAITI MINISTER**
Iraqi newspapers denounced Kuwait's foreign minister as a U.S. agent Monday, pouring oil on the flames of a Persian Gulf crisis Arab leaders are struggling to stifle with a flurry of diplomacy.
- July 24, 1990: IRAQ WANTS GULF ARAB AID DONORS TO WRITE OFF WAR CREDITS**
Debt-burdened Iraq's conflict with Kuwait is partly aimed at persuading Gulf Arab creditors to write off billions of dollars lent during the war with Iran, Gulf-based bankers and diplomats said.
- July 24, 1990: IRAQ, TROOPS MASSED IN GULF, DEMANDS \$25 OPEC OIL PRICE**
Iraq's oil minister hit the OPEC cartel Tuesday with a demand that it must choke supplies until petroleum prices soar to \$25 a barrel.
- July 25, 1990: IRAQ TELLS EGYPT IT WILL NOT ATTACK KUWAIT**
Iraq has given Egypt assurances that it would not attack Kuwait in their current dispute over oil and territory, Arab diplomats said Wednesday.
- July 27, 1990: IRAQ WARNS IT WON'T BACK DOWN IN TALKS WITH KUWAIT**
Iraq made clear Friday it would take an uncompromising stand at conciliation talks with Kuwait, saying its Persian Gulf neighbor must respond to Baghdad's "legitimate rights" and repair the economic damage it caused.
- July 31, 1990: IRAQ INCREASES TROOP LEVELS ON KUWAIT BORDER**
Iraq has concentrated nearly 100,000 troops close to the Kuwaiti border, more than triple the number reported a week ago, the Washington Post said in its Tuesday editions.
- August 1, 1990: CRISIS TALKS IN JEDDAH BETWEEN IRAQ AND KUWAIT COLLAPSE**
Talks on defusing an explosive crisis in the Gulf collapsed Wednesday when Kuwait refused to give in to Iraqi demands for money and territory, a Kuwaiti official said.
- August 2, 1990: IRAQ INVADES KUWAIT, OIL PRICES SOAR AS WAR HITS PERSIAN GULF**
Iraq invaded Kuwait, ousted its leaders and set up a pro-Baghdad government Thursday in a lightning pre-dawn strike that sent oil prices soaring and world leaders scrambling to douse the flames of war in the strategic Persian Gulf.

Source: Reuters

Table 1 shows a sample of the lead sentences of reports on the Reuters newswire that preceded Iraq's invasion of Kuwait in August 1990.⁴ Generally each lead corresponds to a single event, though some sentences generate multiple events. For example, the report "July 23, 1990: Iraqi newspapers denounced Kuwait's foreign minister as a U.S. agent Monday" corresponds to an event in the WEIS event coding scheme: the WEIS category 122 is defined as "Denounce; denigrate; abuse". In this event, Iraq is the *source* of the action and Kuwait is the *target*. Together, these generate the event record "900723

IRQ K UW 122" where "900723" is the date of the event, IRQ is a standard code for Iraq, K UW is the code for Kuwait, and 122 is the WEIS category. Table 2 shows the Reuters stories converted to WEIS events.

Table 2
WEIS Coding of 1990 Iraq-Kuwait Crisis

Date	Source	Target	WEIS Code	Type of Action
900717	IRQ	KUW	121	CHARGE
900717	IRQ	UAE	121	CHARGE
900723	IRQ	KUW	122	DENOUNCE
900724	IRQ	ARB	150	DEMAND
900724	IRQ	OPC	150	DEMAND
900725	IRQ	EGY	054	ASSURE
900727	IRQ	KUW	160	WARN
900731	IRQ	KUW	182	MOBILIZATION
900801	KUW	IRQ	112	REFUSE
900802	IRQ	KUW	223	MILITARY FORCE

Event data analysis relies on a large number of events to produce meaningful patterns of interaction. The information provided by any single event is very limited; single events are also affected by erroneous reports and coding errors. However, important events trigger other interactions throughout the system. For example while Iraq's invasion of Kuwait by itself generates only a single event with WEIS code 223—military force—the invasion triggers an avalanche of additional activity throughout the international system as states and international organizations denounce, approve or comment, so the crisis is very prominent in the event record.

The History of Event Data in Foreign Policy Analysis

Event data were originally developed by Charles McClelland in the early 1960s as a bridge between the traditional approach of diplomatic history and the new quantitative analysis of international politics advocated in the behavioral approach⁵. McClelland reasoned that history could be decomposed into a sequence of discrete events such as consultations, threats, promises, acts of violence and so forth. Event data formed a link between the then-prevalent general systems theories of international behavior and the textual histories which provided an empirical basis for understanding that behavior. According to McClelland,

...International conduct, expressed in terms of event data, is the chief dependent variable of international relations research. ... It is interesting that a starting point is provided as readily

by the ordering principle of classical diplomatic history as by the basic concepts of general system analysis. Thus, we may assert that the prime intellectual task in the study of international relations is ... to account for the relations among components of the international system by ... tracing recurring processes within these components, by noting systematically the structure and processes of exchange among the components, and by explaining, finally, the linkages of within-component and between-component phenomena. Obviously the classical definition of diplomatic history is less ponderous and more literary than the general system definition of the task but both ... carry about the same information and involve nearly the same range of choices of inquiry and analysis. (1970,6)

During the 1960s and 1970s, several event data collections were assembled. The COPDAB (Azar 1980, 1982; Azar and Sloan 1975) and WEIS (McClelland 1976) data sets attempt to code all interactions by all states and some non-state actors such as the United Nations and various national liberation movements; the COPDAB and WEIS coding schemes have subsequently been used in a number of other data sets. A variety of domestic and international event data were also collected in the context of more general data sets such as Rudolph Rummel's "Dimensionality of Nations" collection (Rummel 1972), the *World Handbook* (Taylor and Hudson 1972) and various internal conflict data sets collected by Ted R. Gurr (Gurr 1974); these usually focus on a limited set of actions such as uses of force, domestic violence, or changes of government. The Comparative Research on the Events of Nations (CREON) data set (Hermann et al 1977), which is specifically designed for the analysis of foreign policy, was also developed during this period.

For a period in the late 1970s and early 1980s, event data were collected by United States governmental agencies such as Department of State, Department of Defense and various intelligence agencies (see Andriole and Hopple 1984; Hopple 1984; Hoople et al 1984; Daly and Andriole 1980; Laurance 1990) and private political consulting firms such as CACI Inc. The Department of State experimented with coding event data for a small set of states in 1971 in its Foreign Relations Indicator Project (FRIP) (see Lanphier 1975). The Pentagon's Defense Advanced Research Project Agency (DARPA) sponsored a large-scale project in the 1970s to develop event data models for crisis forecasting and management, and in the early years of the Reagan administration, a major event data collection and analysis effort was undertaken by the National Security Council staff in the White House.

These efforts apparently had little long-term impact on the formulation of foreign policy, though many of these event data sets are now available in the archives of the Inter-University Consortium for Political and Social Research at the University of Michigan and are used in research.⁶ Laurance (1990) analyzes the reasons for the limited impact of event data on policy: these include the failure to coordinate the event data projects with the analysts and policy-makers who were supposed to use the data, the absence of guidelines on how event data could be used with traditional, non-statistical sources of information, and the absence of user-friendly analytical tools.

Event data collection went into a hiatus in the mid-1980s, though the COPDAB and WEIS data continued to be refined, other data sets such as CREON were used in research, and some new data sets

focusing on international crises—notably Russell Leng's Behavioral Correlates of War (BCOW; Leng 1987) and Frank Sherman's SHERFACS (Sherman and Neack 1993)—were developed during this time. Large-scale event data efforts were revived in the early 1990s in the second phase of the National Science Foundation's Data Development in International Relations project (DDIR), directed by Dina Zinnes and Richard Merritt (see Merritt, Muncaster and Zinnes 1993). Rather than simply extending the work of the 1970s, DDIR emphasized the development of new approaches, with particular emphasis on exploiting the computing power available in personal computers and using machine-readable news sources.

Event Data Sets

Event data sets fall into two general categories: Actor-oriented data sets record all interactions between a set of actors for a specific period of time, for example the Middle East 1949-1969. Episode-oriented sets look at the events involved in a specific historical incident, usually an international crisis or use of force.

Actor-Oriented Data Sets

WEIS

The WEIS coding scheme classifies events into 63 specific categories; these are organized into 22 general categories such as "Consult", "Reward", "Protest" and "Force" (see Table 3). The general categories form a very rough cooperation-conflict continuum. WEIS coding was the *de facto* standard used by the US government-sponsored projects during the 1970s, and consequently a number of the data sets in the ICPSR use the WEIS scheme.

The WEIS data set available at the ICPSR covers only eleven years (1966-1977) and contains only about 90,000 events; the source text is *The New York Times*. Data after 1977 have continued to be coded by McClelland and several of his students—most recently Rodney Tomlinson at the US Naval Academy—but the full series is not available in the public domain at the present time. DDIR has sponsored the development of an machine-coding system for WEIS (Gerner et al, 1994) which could facilitate the generation of WEIS-coded data in the future.

Because most common statistical routines, such as regression analysis, use numerical rather than categorical data, WEIS events are often averaged into numerical scores before being analyzed. Vincent (1979) and Goldstein (1992) provide two such scales that assign numbers on a cooperation-conflict continuum to each WEIS category; Figure 2 was produced using Goldstein's scale. WEIS codes can also be translated into the COPDAB scale, though one cannot translate from COPDAB to WEIS because COPDAB makes fewer distinctions in the type of event.

TABLE 3
EXAMPLES OF WEIS EVENT CODES

11. REJECT

- 111 Turn down proposal; reject protest demand; threat
- 112 Refuse; oppose; refuse to allow

12. ACCUSE

- 121 Charge, criticize, blame, disapprove
- 122 Denounce, denigrate, abuse

13. PROTEST

- 131 Make complaint (not formal)
- 132 Make formal complaint or protest

17. THREATEN

- 171 Threat without specific negative sanctions
- 172 Threat with specific nonmilitary negative sanctions
- 173 Threat with force specified
- 174 Ultimatum: threat with negative sanctions and time limit specified

18. DEMONSTRATE

- 181 Non-military demonstration; walk out on
- 182 Armed force mobilization, exercise and/or display

TABLE 4
EXAMPLES OF COPDAB EVENT CODES

- 09** Nation A expressed mild disaffection toward B's policies, objectives, goals, behaviors with A's government objection to these protestations; A's communique or note dissatisfied with B's policies in third party
- 10** Nation A engages in verbal threats, warning, demands and accusations against B; verbal, hostile behavior.
- 11** Nation A increases its military capabilities and politico-economic resources to counter Nation B's actions or the latter's contemplated actions; A places sanctions on B or hinders B's movement in waterways or on land and attempts to cause economic problems for B.

COPDAB

The COPDAB data set is substantially larger in size and scope than WEIS, with about 350,000 international events for the period 1948-1978. COPDAB uses a number of different news sources rather than depending solely on *The New York Times*; in particular it uses a variety of regional sources to cover events outside of North America and Europe.⁷ In contrast to the categories in WEIS, COPDAB

uses an ordered coding scheme that goes from 1 to 16 (see Table 4) supplemented by a numerical cooperation-conflict intensity scale developed by Azar and Sloan (1975). COPDAB coding also classifies an event into one of eight types—for example symbolic, political, military, economic or cultural.

Under DDIR sponsorship, a group at the University of Maryland directed by Ted R. Gurr and John Davies is extending the COPDAB data set from 1990 to the present (Davies and McDaniel 1993). Their project, the Global Event Data System (GEDS) is based on the COPDAB framework but uses a much richer data format that preserves much of the original text reporting the event; GEDS also codes a number of internal political actors, particularly ethnic groups.

CREON

The Comparative Research on the Events of Nations data set (Hermann et al 1977; East, Salmore and Hermann 1978) is specifically designed for the study of foreign policy interactions. Its basic event coding scheme is similar to that of WEIS, but CREON in addition codes over 150 variables dealing with the context of the event, related actions, and internal decision-making processes. Unlike WEIS and COPDAB, CREON does not code all interactions during a period of time: instead it covers a random sample of time periods during 1959-1968 and a stratified sample of 36 nation-states which contains a disproportionate number of developed and English-speaking countries. The purpose of CREON is to study the foreign policy *process*, rather than foreign policy output. In practice this means that CREON is better suited than WEIS or COPDAB to studying the linkages between the foreign policy decision-making environment and foreign-policy outputs for specific decisions, but it cannot be used to study policy outputs over a continuous period of time or for countries not in the sample.

Other Actor-Oriented Event Data Sets

While WEIS, COPDAB and CREON are the largest actor-oriented data sets, a variety of smaller sets exist. As noted earlier, the ICPSR has several regionally-specific, WEIS-coded data sets dating from the 1970s, and additional regional data sets are being collected at the present time. The South Africa Event Data set (SAFED; van Wyk and Radloff 1993) is a WEIS-coded collection focusing on southern Africa for the period 1977-1988; it has unusually dense coverage of non-state actors such as guerrilla movements. Ashley (1980) assembled a data set focusing only on the interactions of the superpowers—the USA, USSR and PRC—for 1950-1972; this contains about 15,000 events and is coded with a COPDAB-like scale.

Episode-Oriented Data Sets

BCOW

The Behavioral Correlates of War data set (Leng 1987) codes a sample of 38 major international crises over the period 1816-1975; roughly half of these crises culminated in war and the other half were resolved without war. Most of the crises (31 out of 38) are in the 20th century; about a third (12) are post-WWII; and many of the crises preceding WWI and WWII are included in the sample. BCOW's event codes are an expanded version of the WEIS scheme containing about 100 categories and differentiating more clearly between verbal, economic and military behavior. Leng (1993b) contains an extensive analysis of this data set.

BCOW uses multiple sources of information, including newspaper accounts, diplomatic histories, and chronologies (Leng 1987:1). The number of events in each crisis range from 120 events in the 1889-90 British-Portugal crisis in southern Africa to 2352 events in the 1956 Suez crisis. The ICPSR data set is accompanied by a very extensive coding manual that would allow a researcher to code additional crises in a manner consistent with the original data; it also includes some specialized software that can be used to analyze the data.

TABLE 5
EXAMPLES OF BCOW EVENT CODES

Military Actions (sample from a total of 36 categories)

11212	International Peacekeeping Force
11333	Alert
21143	Change in Combat Force Level
31133	Fortify Occupied Territory

Diplomatic Actions (sample from a total of 35 categories)

12121	Negotiate
12362	Declare Neutrality
12213	Punish or Restrict Foreign Nationals
32151	Grant Independence to Colony

Economic Actions (sample from a total of 20 categories)

13121	Economic Negotiation
23121	Sell or Trade
23231	Pay for Goods or Services

Unofficial Actions (sample from a total of 11 categories)

14251	Proforeign Demonstration
14213	Antiforeign Demonstration
14152	Hostage Taking

CASCON

The Computer-Aided System for the Analysis of Local Conflicts system (CASCON) codes the characteristics of 66 internal and international conflicts during the post-World War II period. The analytical framework is based on a study by Bloomfield and Leiss (1969) and is organized around six predefined conflict phases ranging from the issues leading to the initiation of the dispute to the resolution of the dispute. CASCON codes 540 "factors" for each crisis; some of these describe specific types of events, others describe contextual characteristics of the crisis such as whether the parties to the conflict are dependent on outside aid.

The current version of the data set, CASCON III (Bloomfield and Moulton 1989) is an integrated "decision support system" designed to help decision-makers compare current crises with the historical data on the 66 CASCON crises; the system runs on a personal computer. The CASCON III system contains the conflict data set, a variety of analytical tools that can be used to compare conflicts, and a subsystem for entering new cases into the database. An earlier version on the data set, containing only 52 cases during the 1945-1969 period and without the analytical software, is available from the ICPSR.

SHERFACS

The SHERFACS data set (Sherman and Neack 1993) codes over 700 international disputes and almost 1000 domestic disputes in the 1945-1984 period. It combines several different coding schemes, including COPDAB event codes, the CASCON crisis phase structure, and a variety of conflict management variables originally used in the Butterworth (1976) data set in crisis mediation. SHERFACS is particularly strong on coding nonstate actors such as ethnic groups, transnational actors such as intergovernmental organizations, and non-national actors such as multinational corporations.

An early version of SHERFACS is available from the ICPSR (Alker and Sherman 1982, 1986); the current version is being completed as part of the DDIR project. While SHERFACS is not part of an integrated software system like CASCON, John Mallery and Sigrid Unseld (1992; Mallery forthcoming) have been developing specialized software for analyzing the data and deriving general rules from it. This software is based on artificial intelligence techniques and could be generalized to work with other types of event data.

Other Episode-Oriented Event Data Sets

As noted above, several other data collections available from the ICPSR such as *The World Handbook* contain some limited amounts of event data. Another example is the PRINCE Project data set (Coplin, O'Leary and Shapiro, n.d.). This data set was originally collected in conjunction with a computer simulation project and contains a small set of event data dealing with political issue positions for the period 1 January 1972 to 30 June 1972. Other data sets have been collected for the study of a specific crisis: for example Lebovic (1993) coded events during the period prior to the 1991 Gulf War (2

August 1990 to 16 January 1991) in order to analyze the impact of foreign policy "momentum" in that crisis.

Applications

Event data have been used in a variety of different studies in foreign policy analysis. This section will briefly discuss five applications that illustrate some of the different analytical techniques employing event data.

Reciprocity in Superpower Interactions

In an extensive analysis reported in their book *Three Way Street*, Joshua Goldstein and John Freeman (1990) combine three event data sets—WEIS, COPDAB and Ashley's superpower data—to create a time series of interactions between the USA, Soviet Union and the People's Republic of China extending from 1948 to 1986. This data is analyzed using a statistical technique called vector autoregression, which assesses the effects of a change in one variable in the system on other variables.

The study is important in two respects. First, the 40-year time series clearly displays the major shifts in the relationships between three major powers, such as the Cold War of the 1950s between the USA and USSR, the détente period of the early 1970s and the Reagan-Brezhnev "New Cold War" of the early 1980s. Similarly, the effects of the Cultural Revolution and the Nixon *rapprochement* with China can be seen in the US-Chinese relationship.

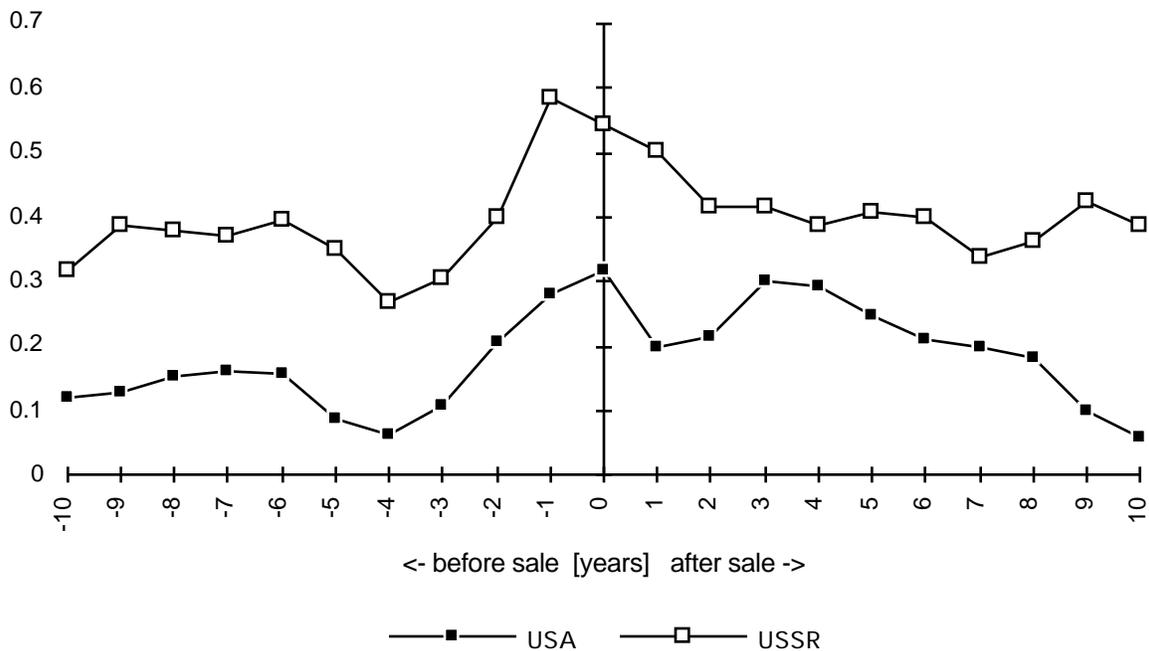
Goldstein and Freeman's statistical findings show that most of the interactions between the superpowers were reciprocal—each state received interactions from other superpowers similar to those it projected to them. This pattern of reciprocity had been predicted by a number of theories, and more generally the study of reciprocal behavior has been a major focus of event data research.⁸ The study also showed a great deal of inertia in the superpower relationships: the level of cooperation or conflict was maintained about the same level from year to year, changing only slowly.

Political Influence in Arms Transfers

Schrodt (1983) studies the effects of the international sale of weapons on international behavior using event data. One key concern in this arms transfer research is the "arms and influence" relationship: does the supplier of weapons gain political influence over the recipient?

The study uses data from the Stockholm International Peace Research Institute on weapons sales from the USA and USSR to a number of Middle Eastern countries; the COPDAB data set is used to measure cooperative and conflictual behavior between the supplier and recipient. The statistical technique was crosscorrelation: the correlation between the level of sales and the cooperative or conflictual behavior at times before and after the arms transfer.

Figure 3
Crosscorrelation of Arms Transfers and
International Cooperation from Receptient to Supplier



This technique was successful in demonstrating a number of features of the arms and influence relationship. As expected, there was no significant influence prior to the transfer—except during the one or two years prior to the transfer when it was probably being negotiated—but the data showed statistically significant cooperation lasting for about five years after the transfer.

The contrast between the USA and USSR was even more interesting. As expected, the cooperation of recipients with the Soviet Union was considerably higher than that with the United States: the USSR gained more cooperation, in the short term, from its recipients. However, in the longer term, after about five years, the Soviet Union also had significantly increased *conflict* with its recipients, whereas arms transfers did not significantly change conflictual behavior towards the United States. This results for the Soviet Union had been anticipated in some of the nonstatistical literature (see for example Pierre 1982:81-82), where the tendency of the Soviet Union to alienate its arms recipients was known informally as the "Ugly Russian problem".

Interdependence of International Interactions

Schrodt and Mintz (1988) use the COPDAB data set to study interactions between six Middle Eastern states: Jordan, Syria, Saudi Arabia, Kuwait, Iraq and Iran during the period 1948 to 1978. The study looked at the probability that an interaction between one pair of nations—for example Syria to Iran—would trigger other interactions, for example Iran to Syria or Saudi Arabia to Iraq.

The study reached a number of conclusions—for example we found that interactions almost always increase, rather than decrease, the probability of other interactions. However, in retrospect our most interesting finding was the prominent role of Kuwait:

... when some interaction occurs with Kuwait, this interaction disproportionately sets off other interactions in the system. This initially seems counterintuitive because Kuwait is the least powerful of the states we are studying, though that status may be the *reason* Kuwait is so important. If this characteristic holds generally, we may find that minor powers are more important in determining interaction interdependence than major powers. (1988:227-228)

This was written in 1984, six years before the 1990-1991 Iraq-Kuwait crisis. The importance of Kuwait was deduced exclusively from the event data itself, rather than from a traditional political analysis.

Decision-Making Units and Foreign Policy

Hermann and Hermann (1989) use the CREON data set to study the effect that the type of foreign policy decision-making unit has on the character of foreign policy. The types of decision-making unit studied are "predominant leader", "single group" and "multiple autonomous actors"; these are described elsewhere in this volume. The nation-states in the CREON data set are coded into these categories according to an explicit set of coding rules; in many cases the category varies due to changes in governments and in some countries (e.g. Switzerland) differs depending on the foreign policy issue. The CREON event data provided the dependent variable, foreign policy behavior, which was coded for affect, commitment and the choice of instruments of statecraft, and the study also controlled for whether the unit was self-contained or could be influenced externally.

The results of the study are clearest on the issue of affect. Hermann and Hermann report:

The single group decision units engaged in the most extreme behavior of the three types, evidencing the most conflictual behavior. Multiple autonomous actors were the least conflictual, with predominant leaders in between. ... Also as hypothesized, self-contained decision units [a control variable] were significantly more conflictual—that is, more extreme in their behavior—than the externally influenceable units. (1989:380)

In the areas of commitment and choice of instruments, the results are more complex, with interaction effects between the type of decision unit and the control variables. For example, "predominant leaders in self-contained units (the insensitive leaders) use more economic and military instruments of statecraft than those in the externally influenceable units (the sensitive leaders)." (1989: 382).

Influence Strategies in Militarized Interstate Conflicts

Leng (1993a) used the BCOW data to study the relationship between the bargaining strategies employed by states in a dispute and the outcome of the dispute. Starting with the 40 crises in BCOW and eliminating those crises where no negotiations preceded war, Leng classifies the influence strategies used by 70 parties to the crises into three categories:⁹

Bullying: "the actor employs increasingly severe negative inducements until the other side complies with its demands;"

Reciprocating: "Tit-for-Tat responses to the actions of the other side, along with occasional unilateral cooperative initiatives;"

Trial-and-Error: "the actor simply adjusts its choice of inducements based on the target's response to the preceding influence attempt; ...inducements that produce positive responses are repeated and inducements that produce negative responses are changed."(1993a:5)

These strategies were identified using the events recorded in the BCOW data set.

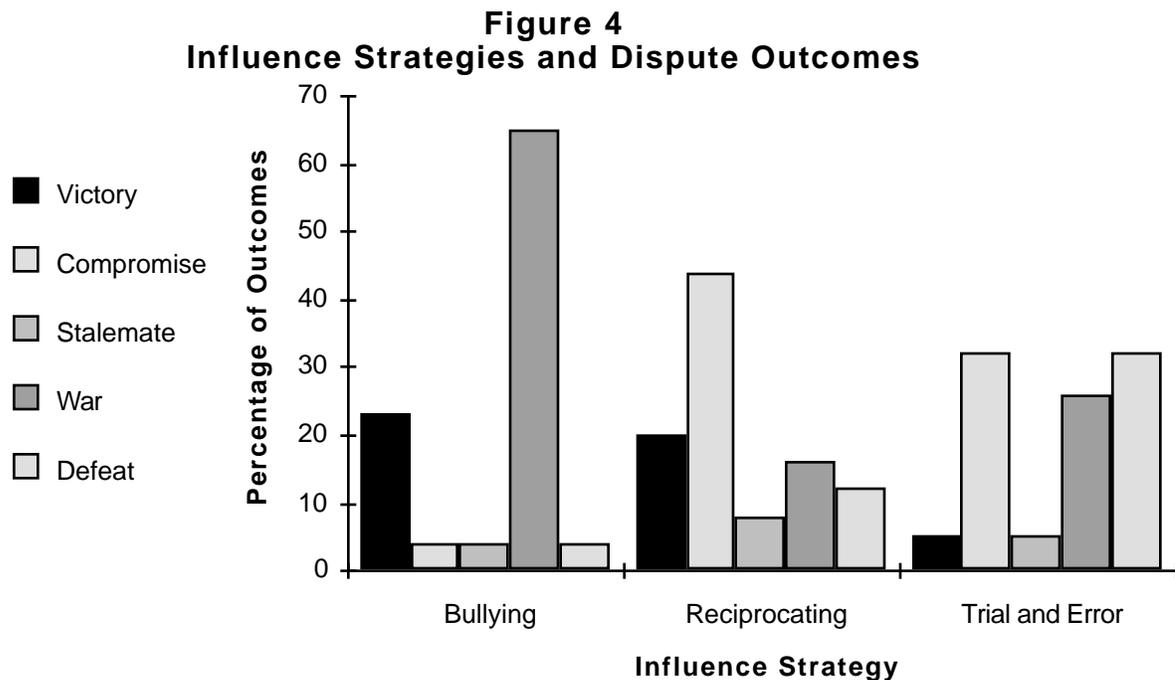


Figure 4 shows the relationship with the strategies used and the crisis outcomes. As Leng observes:

The comparison between escalating coercive bullying strategies and reciprocating strategies is particularly striking. Escalating bullying strategies leads to war or submission in 69% of the cases, and to a victory or compromise in 27% of the cases; whereas reciprocating influence strategies leads to a victory or compromise in 64% of the cases, and to war or submission in 28% of the cases. When bullying strategies are successful, they do tend to result in diplomatic victories (23%), rather than compromises (4%), but reciprocating strategies also achieve diplomatic victories in 20% of the cases ... along with compromises 44% of the time. (1993a:6)

The trial and error strategy is intermediate between the other two strategies, producing more war and less compromise than the reciprocating strategy but less war and more compromise than the bullying strategy. Leng's results reinforce the theoretical results of Axelrod (1984) and a number of other researchers on the value of tit-for-tat strategies in conflict situations.

Problems with Event Data

Event data, like any data used in social research, contain errors due to their source, coding techniques and other factors. The advantages and disadvantages of event data have been extensively studied and discussed; the field is nothing if not introspective.¹⁰ The following is a brief survey of these issues.

Coding Systems

Reflecting the Cold War environment in which they were first developed, the existing coding systems, particularly WEIS and COPDAB, focus primarily on military and diplomatic interactions between nation-states. They provide considerably less detail on economic interactions, newer issues such as refugees, multilateral operations and environmental regulation, and non-state actors such as international organizations and sub-national groups.¹¹ This is not a problem if one is primarily interested in diplomatic and military interactions between nation-states, but many contemporary studies have a broader focus.

Because of the substantial expense involved with the human coding of events, little experimentation has been done with the implications of alternative coding schemes and the idiosyncrasies of the existing codes have been frozen into place. For example, WEIS has separate codes for a "Warning" and "Threat", though these are often synonymous, and it has only three categories for the use of force, whereas BCOW recognizes about twenty.

Despite its popularity in statistical studies, the conflict-cooperation continuum used by COPDAB and the scaled transformations of WEIS is problematic because there is considerable evidence that conflict and cooperation are *independent* dimensions in international behavior. Nations that have extensive cooperation, for example in trade or alliances, also tend to have greater conflict than nations that are mutually isolated.

Most and Starr (1984) have identified the general empirical problem of "foreign policy substitutability": different actions in foreign policy may have the same general effect. For example, Israel and the Palestine Liberation organization agreed to mutual recognition in 1993 following secret talks mediated in Norway and a public ceremony at the White House, but one could as easily imagine a different set of circumstances where the recognition occurred after secret talks at the United Nations and a public ceremony in Egypt. Depending on the theoretic issue being discussed, these two scenarios might or might not be considered equivalent. The effect of an event data coding scheme is to define a set of equivalent foreign policy actions and assign them identical codes, but the same set of codes may not work equally well for all theoretical questions.

In all likelihood, there will be greater experimentation with new coding systems in the future, particularly as machine-coding systems are developed. The reports of the early event data efforts by researchers such as McClelland and Azar show they had no intention of freezing into place a single

standard for event coding; instead they expected that their coding schemes would be refined through experience and further theoretical developments. As the cost of coding drops, such experimentation and refinement should be possible.

Source Bias

One of the most widely studied problems in event data collection are the editing and coverage biases introduced by the journalistic sources. One of the earliest systematic studies of this problem was Doran, Pendley and Antunes (1973), who found a dramatically higher level of reported violence in Latin America if they used regional sources rather than international sources. Azar (Azar and Ben Dak, 1975:4) found only a 10% overlap between events reported in *The New York Times* and *Middle East Journal*, with the *MEJ* more likely to report cooperative events. Hoggard (1974) generally finds only 10% to 20% overlap between *The New York Times Index* and regional sources; Gerner et al (1994) report a similar low level of overlap when comparing Reuters with two specialized regional sources.

The interactions of some 180 nation-states are necessarily complex, and it is unlikely that any event data set will capture more than a few percent of all political activities. However, some events, such as the outbreak of war, are more important in determining international behavior than others, and the likelihood of missing an event is probably inversely proportional to its importance: the more important an event, the more likely it will be reported.

Researchers have taken two different approaches to this problem. Some projects, such as COPDAB, SAFED and BCOW, have used multiple sources to try to capture as many events as possible. This effort is still limited by the time and resources available to the project but as a greater number of machine-readable sources become available, the costs of coding from multiple sources has decreased. Other projects, such as WEIS, CREON and GEDS, have relied on a single source—*The New York Times*, *Deadline Data*, and Reuters respectively—under the assumption that by maintaining a consistent sources, the *changes* in the patterns of interaction will be more evident.

Additional Variables

All event data sets have in common the use of a basic "<date><source><target><event>" format, but they differ substantially in whether additional information is coded. WEIS codes only the simple format and an optional "arena" code; COPDAB adds an "issue type" code (e.g. diplomatic, military, economic). BCOW and GEDS, in contrast, add dozens of additional variables; SHERFACS and CREON contain hundreds of factors.

Most of this additional information could be categorized as providing "context" for the event. For example, what sub-national decision unit was responsible for the event? What other events were related to it; what other actors were involved? If the event occurs during a crisis, is it part of an escalation or de-escalation? What is the underlying intent of the event, if that can be inferred? In

some of the data sets, particularly those dealing with crises, this context, rather than the pattern of discrete events, is the primary focus of the data collection.

The motivation behind adding contextual information to an event record is clear: human decisionmakers perceive events in a very context-rich manner. Human associative memory provides decision-makers with immediate linkages to other events, provides a means of inferring motive and so forth. However, whether one can *systematically* analyze contextual information is an open issue—after all, if one really wants context, one should be reading the original text sources and not bothering with event data in the first place. Most of the existing applications of event data have not used the contextual information and instead have focused on very crude aggregate measures such as moving averages, though this is changing as more sophisticated analytical tools, such as those used with CASCON and SHERFACS, are developed.

Future of event data

While the concept of event data is nearly three decades old, the approach has just begun to enter its second generation. Most of the event data research efforts to date have been based on concepts and techniques little changed since 1970. However, fundamental changes in the information processing capabilities available to researchers now make possible analytical techniques that were impossible when events data were first developed. Inexpensive personal computers have already passed the speed and mass-storage capacities of university mainframes available in the 1970s, and are rapidly approaching the capacities of supercomputers available in the 1980s. At the same time, many of the sources traditionally used for event data coding have become available in machine-readable form. Consequently, the past may be a poor guide to the future and what was practically impossible a decade ago may be trivial a decade from now. The impact of increased computing power is most clearly reflected in machine coding and new analytical methods.

Machine Coding

The human coding of event data is slow and expensive. Laurance (1990) estimated that DARPA spent approximately \$1-million on a variety of event data projects in the period 1967-1973, this is equivalent of about \$3.5-million in 1993 dollars. While there has been occasional public funding of event data research since that time—for example the National Security Council support for WEIS in the early 1980s and the \$380,000 in NSF funds to DDIR in the early 1990s—these amounts have not been sufficient to systematically maintain existing data sets, much less experiment with new data or coding schemes.

Machine-readable texts dealing with political events and the availability of low-cost personal computers capable of automated coding are changing this situation. Over the past five years, a number of newspapers have become available on CD-ROM, as has *Facts on File*. These newspapers, as well as newswire services such as Reuters, United Press International, Agence France Press and a number

of regional newswires are also available on commercial data services such as NEXIS and Dialog. These sources allow the possibility of having a computer do the event data coding rather than using human coders. This dramatically reduces the cost of generating the data and should therefore encourage experimentation with new coding schemes.

Over the past three years a group at the University of Kansas has been developing, with DDIR funding, a machine-coding system called the Kansas Event Data System (KEDS, see Gerner et al 1994). KEDS does some simple linguistic parsing of the news reports—for example it identifies the political actors, recognizes compound nouns and compound verb phrases, and determines the references of pronouns—and then employs a large set of verb patterns to determine the appropriate WEIS event code. KEDS can take Reuters newswire reports as input and generate a WEIS event data set as output with no human intervention. KEDS-generated data appears to track political events quite well and statistical analyses using KEDS data do not appear to differ systematically from the results obtained with human-coded data (Schrodtt and Gerner 1994).

Machine-coding has limitations when compared to human-coding: KEDS could not handle a complex event coding scheme such as that used in BCOW, SHERFACS or GEDS; it fails to correctly code some complex sentences, and it cannot handle situations whose interpretation requires complex background information. Development of the verb pattern and actor dictionaries for KEDS also required an extensive investment of labor. On the other hand, machine coding can be considerably more sophisticated than KEDS. Lehnert and Sundheim (1991) report on a series of artificial intelligence projects that extract a complex set of data from newswire reports. These methods are still experimental but suggest that in the future software may be available to handle coding schemes considerably more complex than WEIS.

New Analytical Techniques

Events data are very different from the data used in most statistical studies in the social sciences (see Schrodtt forthcoming). The conventional statistical repertoire of the social sciences has almost no techniques explicitly adapted to this type of data and, as Achen (1987) points out, there has been virtually no original statistical work to fill these gaps. To date most of the effort in event data analysis has been devoted to carefully constructing and implementing coding schemes rather than systematically exploring what one can do with the data once it has been collected.

McClelland originally envisioned event data as being analyzed as patterns of discrete events.¹² . These efforts were unsuccessful: after some years of work with events data focusing on several crises, McClelland concluded,

It proved relatively easy to discern event patterns and sequences intuitively. We found we could follow the successions of action and response in flow diagram form. Stages of crisis and the linkage of event types to temporary *status quo* situations also were amenable to investigation. We were defeated, however, in the attempt to categorize and measure event

sequences. This was an early expectation that was disappointed by the data which showed too few significant sequences to support quantitative or systematic treatment. (1970:33)

With the perspective of two decades of hindsight, the information processing technology and sequence analysis techniques available to McClelland were woefully inadequate. McClelland writes of analyzing hundreds or at most thousands of events; a contemporary events data researcher has available hundreds of thousands of events and would be capable of working with millions.

While many studies of event data use still relatively simple methods, in recent years a variety of more complex techniques have been proposed. Some of these are based on advanced statistical methods such as vector autoregression (Goldstein and Freeman 1990), Poisson regression (King 1989) and event history analysis (Allison 1984). Another set of techniques for event data analysis is found in the computational modelling literature derived from research in artificial intelligence (Hudson 1991; Unseld and Mallery 1992); techniques designed to study molecular sequences (Sankoff and Kruskal 1983) has inspired some other methods; and some computation methods are being specifically designed to analyze sequences of social and political events (Heise 1988, Schrodt 1990). Most of these new methods require substantial amounts of computing power and would have been impractical a decade ago, so in the future it may be possible to do considerably more systematic analysis with event data than was possible in the past.

Conclusion

The event data approach demonstrates that it is possible to systematically code a very large number of individual foreign policy interactions and then use that information to test general hypotheses about foreign policy behavior using statistical techniques. These hypotheses may deal with national-level characteristics (Hermann and Hermann 1989); the effectiveness of specific strategies (Schrodt 1983, Leng 1993); patterns of interaction within a subsystem (Schrodt and Mintz 1988, Goldstein and Freeman 1990, van Wyk and Radloff 1993); or patterns in a type of behavior such as a crisis (Sherman and Neack 1993).

The existence of an assortment of event data sets in public archives such as the ICPSR simplifies and systematizes the measurement of many characteristics of interest to analysts of foreign policy behavior. Event data provide a means of controlling, for example, for the effect of the USA-USSR détente in studying the foreign policy of the United States or the effects of the Camp David agreements on the foreign policy of Israel. While event data are an imperfect indicator, they are still likely to provide a better measure than alternatives such as assuming the détente period coincided with the Nixon administration or that the Camp David agreements had an immediate impact. The behaviors measured by event data may also be at the core of a study: this is particularly true for CREON and the episode-oriented data sets.

The early work in event data analysis was confined to methods that by contemporary standards were slow, laborious and oftentimes of dubious statistical value. The quantum leap in information processing capability in the past decade has clearly opened the way for a distinct second-generation of event data analysis where machine-assisted coding replaces human coding, computer-intensive sequence analysis methods replace descriptive statistics and contingency tables, and analytical software designed to work with specific data sets—currently seen with BCOW, CASCON and SHERFACS—supplements the use of standard statistical packages. The implications of this change for the field of foreign policy analysis are as yet unclear, but they are potentially profound.

BIBLIOGRAPHY

- Achen, Christopher. 1987. "Statistical Models for Event Data: A Review of Errors-in-Variables Theory." Presented at the DDIR Conference on Event Data, Columbus, OH.
- Alker, Hayward R. Jr., and Frank L. Sherman. 1982. "Collective Security Seeking Practices Since 1945." In *Managing International Crises*, ed. Daniel Frei. Beverly Hills: Sage.
- Alker, Hayward R. Jr., and Frank L. Sherman. 1986. *International Conflict Episodes, 1945-1979*. (ICPSR 8303) Ann Arbor: Inter-University Consortium for Political and Social Research.
- Allison, Paul D. 1984. *Event History Analysis: Regression for Longitudinal Event Data*. Beverly Hills: Sage Publications.
- Andriole, Stephen J., and Gerald W. Hopple. 1984. "The Rise and Fall of Events Data: From Basic Research to Applied Use in the U.S. Department of Defense." *International Interactions* 11:293-309.
- Ashley, Richard K. 1980. *The Political Economy of War and Peace*. London: Frances Pinter.
- Azar, Edward E. 1980. "The Conflict and Peace Data Bank (COPDAB) Project." *Journal of Conflict Resolution* 24:143-152.
- Azar, Edward E. 1982. *The Codebook of the Conflict and Peace Data Bank (COPDAB)*. College Park, MD: Center for International Development, University of Maryland.
- Azar, Edward E., and Joseph Ben-Dak, eds. 1975. *Theory and Practice of Events Research*. New York: Gordon and Breach.
- Azar, Edward E., and Thomas Sloan. 1975. *Dimensions of Interaction*. Pittsburgh: University Center for International Studies, University of Pittsburgh
- Azar, Edward E., R.D. McLaurin, Thomas Havener, Craig Murphy, Thomas Sloan and Charles H. Wagner. 1977. "A System for Forecasting Strategic Crises: Findings and Speculations About Conflict in the Middle East" *International Interactions* 3:193-222.
- Azar, Edward E., Richard A. Brody and Charles A. McClelland. 1972. *International Events Interaction Analysis: Some Research Considerations*. Beverly Hills: Sage Publications.
- Azar, Edward E., Stanley H. Cohen, Thomas O. Jukam and James McCormick. 1972. "Making and Measuring the International Event as a Unit of Analysis." In *International Events Interaction Analysis: Some Research Considerations*, ed. Edward E. Azar, Richard A. Brody and Charles A. McClelland. Beverly Hills: Sage Publications.
- Bloomfield, Lincoln P., and Amelia C. Leiss. 1969. *Controlling Small Wars*. New York: Knopf.
- Bloomfield, Lincoln P., and Allen Moulton. 1989. *CASCON III: Computer-Aided System for Analysis of Local Conflicts*. Cambridge Mass.: MIT Center for International Studies.
- Brody, Richard A. 1972. "International Events: Problems in Measurement and Analysis." In *International Events Interaction Analysis: Some Research Considerations*, ed. Edward E. Azar, Richard A. Brody and Charles A. McClelland. Beverly Hills: Sage Publications.
- Burgess, Philip M., and Raymond W. Lawton. 1972. *Indicators of International Behavior: An Assessment of Events Data Research*. Beverly Hills: Sage Publications.
- Butterworth, Robert Lyle. 1976. *Managing Interstate Conflict, 1945-74: Data with Synopses*. Pittsburgh: University Center for International Studies.

- Coplin, William, Michael O'Leary and Howard Shapiro. n.d. *PRINCE Project: International Transactions, Issue Specific Interactions and Power Data Sets, 1966-1972 (ICPSR 5006)*. Ann Arbor: Inter-University Consortium for Political and Social Research.
- Daly, Judith Ayres, and Stephen J. Andriole. 1980. "The Use of Events/ Interaction Research by the Intelligence Community." *Policy Sciences* 12:215-236.
- Davies, John L., and Chad K. McDaniel. 1993. "The Global Event-Data System." In *International Event Data Developments*, ed. Richard L. Merritt, Robert G. Muncaster and Dina A. Zinnes. Ann Arbor: University of Michigan Press.
- Dixon, William J. 1986. "Reciprocity in United States-Soviet Relations: Multiple Symmetry or Issue Linkage." *American Journal of Political Science* 30:421-45.
- Doran, Charles F., Robert E. Pendley, and George E. Antunes. 1973. "A Test of Cross-National Event Reliability." *International Studies Quarterly* 17: 175-203.
- East, Maurice A., Stephen A. Salmore and Charles F. Hermann, eds. 1978. *Why Nations Act: Theoretical Perspectives for Comparative Foreign Policy Studies*. Beverly Hills: Sage Publications.
- Gaddis, John Lewis. 1987. "Expanding the Data Base: Historians, Political Scientists and the Enrichment of Security Studies." *International Security* 12:3-21.
- Gerner, Deborah J., Philip A. Schrodt, Ronald A. Francisco, and Judith L. Weddle. 1994. "The Machine Coding of Events from Regional and International Sources." *International Studies Quarterly* 37: [Note to editors: we don't know the page numbers yet]
- Goldstein, Joshua S., and John R. Freeman. 1990. *Three-Way Street: Strategic Reciprocity in World Politics*. Chicago: University of Chicago Press.
- Goldstein, Joshua S. 1991. "Reciprocity in Superpower Relations: An Empirical Analysis." *International Studies Quarterly* 35:195-209.
- Goldstein, Joshua S. 1992. "A Conflict-Cooperation Scale for WEIS Events Data." *Journal of Conflict Resolution* 36: 369-385.
- Gurr, Ted Robert. 1974. *Civil Strife Events, 1955-1970 (ICPSR 7531)*. Ann Arbor: Inter-University Consortium for Political and Social Research.
- Heise, David. 1988. "Modeling Event Structures." *Journal of Mathematical Sociology* 13:138-168.
- Hermann, Charles F. 1987. "Observations from the First Generation of International Event Data Research." Presented at the DDIR Conference on Events Data, Columbus, OH.
- Hermann, Margaret G., and Charles F. Hermann. 1989. "Who Makes Foreign Policy Decisions and How: An Empirical Inquiry." *International Studies Quarterly* 33:361-387.
- Hermann, Charles, Maurice A. East, Margaret G. Hermann, Barbara G. Salmore, and Stephen A. Salmore. 1973. *CREON: A Foreign Events Data Set*. Beverly Hills: Sage Publications.
- Hoggard, Gary. 1974. "Differential Source Coverage in Foreign Policy Analysis." In *Comparing Foreign Policies*, ed. James Rosenau. New York: Wiley.
- Hudson, Valerie M. ed. 1991. *Artificial Intelligence and International Politics*. Boulder: Westview Press.
- Hoople, Gerald W. 1984. "Computer-Based Early Warning: A Staircase Display Option for International Affairs Crisis Projection and Monitoring." In *National Security Crisis Forecasting*

- and Management*, ed. Gerald W. Hoople, Stephen J. Andriole and Amos Freedy. Boulder: Westview Press.
- Hoople, Gerald W., Stephen J. Andriole and Amos Freedy, eds. 1984. *National Security Crisis Forecasting and Management*. Boulder: Westview Press.
- International Studies Quarterly*. 1983. "Symposium: Event data Collections." *International Studies Quarterly* 27:147-177.
- King, Gary. 1989. "Event Count Models for International Relations: Generalizations and Applications." *International Studies Quarterly* 33:123-148.
- Krippendorff, Klaus. 1980. *Content Analysis: An Introduction to its Methodology*. Beverly Hills: Sage Publications.
- Lanphier, Vernard A. 1975. "Foreign Relations Indicator Project" In *Theory and Practice of Events Research*, ed. Edward E. Azar and Joseph Ben-Dak. New York: Gordon and Breach.
- Laurance, Edward J. 1990. "Events Data and Policy Analysis." *Policy Sciences* 23:111-132.
- Lebovic, James H. 1993. "Before the Storm: Momentum and the Onset of the Gulf War". Presented at the annual meeting of the International Studies Association, Acapulco.
- Lehnert, Wendy and Beth Sundheim. 1991. "A Performance Evaluation of Text Analysis." *AI Magazine* 12:81-94.
- Leng, Russell J. 1987. *Behavioral Correlates of War, 1816-1975*. (ICPSR 8606). Ann Arbor: Inter-University Consortium for Political and Social Research.
- Leng, Russell J. 1993a. "Reciprocating Influence Strategies in Interstate Crisis Bargaining." *Journal of Conflict Resolution* 37:3-41.
- Leng, Russell J. 1993b. *Interstate Crisis Behavior, 1816-1980*. New York: Cambridge University Press.
- McClelland, Charles A. 1967a. "Event-Interaction Analysis in the Setting of Quantitative International Relations Research." mimeo, University of Southern California.
- McClelland, Charles A. 1967b. "World-Event-Interaction-Survey: A Research Project on the Theory and Measurement of International Interaction and Transaction." mimeo, University of Southern California.
- McClelland, Charles A. 1968a. "International Interaction Analysis: Basic Research and some Practical Uses." mimeo, University of Southern California.
- McClelland, Charles A. 1968b. "Access to Berlin: The Quantity and Variety of Events, 1948-1963." In *Quantitative International Politics*, ed. J. David Singer. New York: Free Press
- McClelland, Charles A. 1969. "International Interaction Analysis in the Predictive Mode." mimeo, University of Southern California.
- McClelland, Charles A. 1970. "Some Effects on Theory from the International Event Analysis Movement." mimeo, University of Southern California.
- McClelland, Charles A. 1976. *World Event/Interaction Survey Codebook*. (ICPSR 5211). Ann Arbor: Inter-University Consortium for Political and Social Research.
- McGowan, Patrick, Harvey Starr, Gretchen Hower, Richard L. Merritt and Dina A. Zinnes. 1988. "International Data as a National Resource." *International Interactions* 14:101-113.

- Mallery, John C. forthcoming. "Beyond Correlation: Bringing Artificial Intelligence to Events Data." *International Interactions*.
- Merritt, Richard L., Robert G. Muncaster and Dina A. Zinnes, eds. 1993. *International Event-Data Developments*. Ann Arbor: University of Michigan Press.
- Most, Benjamin A., and Harvey Starr. 1984. "International relations theory, foreign policy substitutability and 'nice' laws." *World Politics* 36:383-406
- Munton, D. 1978. *Measuring International Behavior: Public Sources, Events and Validity*. Dalhousie University: Centre for Foreign Policy Studies.
- Peterson, Sophia. 1975. "Research on research: Events data studies, 1961-1972." In *Sage International Yearbook on Foreign Policy Studies*, ed. Patrick J. McGowan. Beverly Hills:Sage.
- Pierre, Andrew J. 1982. *The Global Politics of Arms Sales*. Princeton: Princeton University Press.
- Richardson, Neil R., Charles W. Kegley and Ann C. Agnew. 1981. "Symmetry and Reciprocity as Characteristics of Dyadic Foreign Policy Behavior." *Social Science Quarterly* 62:128-138.
- Rosenau, James. ed. 1974 *Comparing Foreign Policies*. New York: Wiley.
- Rummel, Rudolph J. 1972. *The Dimensions of Nations*. Beverly Hills: Sage Publications.
- Sankoff, David, and Joseph B. Kruskal, eds. 1983. *Time Warps, String Edits and Macromolecules: The Theory and Practice of Sequence Comparison*. New York: Addison-Wesley.
- Schrodt, Philip A. 1983. "The Effects of Arms Transfers on Supplier-Recipient Behavior". Presented at the International Studies Association, Mexico City.
- Schrodt, Philip A. 1990. "Parallel Event Sequences in International Crises." *Political Behavior* 12:97-123.
- Schrodt, Philip A. 1991. "Pattern Recognition in International Event Sequences: A Machine Learning Approach." In *Artificial Intelligence and International Politics*, ed. Valerie M. Hudson. Boulder: Westview Press.
- Schrodt, Philip A. forthcoming. "Statistical Characteristics of Events Data." *International Interactions*.
- Schrodt, Philip A., and Alex Mintz. 1988. "A Conditional Probability Analysis of Regional Interactions in the Middle East." *American Journal of Political Science* 32:217-230
- Schrodt, Philip A., and Deborah J. Gerner. 1994. "Statistical Patterns in a Dense Event Data Set for the Middle East, 1979-1992." *American Journal of Political Science* 38: [Note to editors: we don't know the page numbers yet]
- Sherman, Frank L., and Laura Neack. 1993. "Imagining the Possibilities: The Possibilities of Isolating the Genome of International Conflict From the SHERFACS Dataset." In *International Event Data Developments*, ed. Richard L. Merritt, Robert G. Muncaster and Dina A. Zinnes. Ann Arbor: University of Michigan Press.
- Sigler, John H., John O. Field and Murray L. Adelman. 1972. *Applications of Events Data Analysis: Cases, Issues and Programs in International Interaction*. Beverly Hills: Sage.
- Taylor, Charles L. and Michael C. Hudson. 1972. *World Handbook of Political and Social Indicators*, 2nd ed. New Haven, CT: Yale University Press.
- Unsel, Sigrud D., and John C. Mallery. 1992. "Interaction Detection in Complex Datamodels" (AI Memo No. 1298). Cambridge: MIT Artificial Intelligence Laboratory.

van Wyk, Koos and Sarah Radloff. 1993. "Symmetry and Reciprocity in South Africa's Foreign Policy." *Journal of Conflict Resolution* 37:382-396.

Vincent, Jack E. 1979. *Project Theory: Interpretations and Policy Relevance*. Washington: University Press of America.

Ward, Michael Don. 1982. "Cooperation and Conflict in Foreign Policy Behavior." *International Studies Quarterly* 26:87-126.

Weber, Robert Philip. 1990. *Basic Content Analysis*. Newbury Park, CA: Sage Publications.

Footnotes

¹ Figure 1 is based on the COPDAB scores reported in Goldstein and Freeman (1990:162).

² See Goldstein and Freeman 1990.

³ The data in Figure 2 and the Israel-Lebanon time series mentioned below are discussed in Schrodt and Gerner (1994).

⁴ The Reuters reports were downloaded from the NEXIS data service. The full set of reports is considerably more extensive, particularly during the week prior to the invasion.

⁵ There is a fairly substantial paper trail in the development of events data sets, in particular Azar, Brody and McClelland (1972) provide a series of papers coming out of Azar's Michigan State events data conferences in 1969, 1970 and 1971; Burgess and Lawton (1972) also covers this period. The early theoretical development of WEIS is thoroughly discussed in a series of papers by McClelland (1967a, 1967b, 1968a, 1968b, 1969, 1970); Azar's early development of COPDAB is also fairly well documented (for example Azar and Ben-Dak, 1975, Azar, Cohen, Jukam and McCormick, 1972; Azar and Sloan, 1975).

⁶ The ICPSR has about two dozen international event data sets; most universities with graduate programs are members of the ICPSR and have access to its archives. Some of the more recent data sets discussed below—for example SAFED, GEDS, CASCON III and SHERFACS—are not presently at the ICPSR; they can usually be obtained from the individual researchers.

⁷ Because WEIS and COPDAB are based on different sources, they do not have a high degree of overlap: *International Studies Quarterly* (1983) contains two analyses of this along with a commentary by McClelland.

⁸ See for example Richardson, Kegley and Agnew 1981, Ward 1982, Dixon 1986, Goldstein 1991 and van Wyk and Radloff 1993.

⁹ Leng also identifies two additional cases where a party used an "appeasement" strategy—both resulted in defeat—and two cases where a party used a "stonewalling" strategy—both resulted in war.

¹⁰ See for example Andriole and Hopple 1984, Azar and Ben-Dak 1975, Brody 1972, Burgess and Lawton 1972, Gaddis 1987, *International Studies Quarterly* 1983, Laurance 1990, McGowen et al. 1988, Merritt, Muncaster and Zinnes 1993, Munton 1978, Peterson 1975, Rosenau 1974, and Sigler, Field and Adelman 1972.

¹¹ Some of the nonstate actors active in the 1970s are coded—for example the United Nations, Irish Republican Army and Palestine Liberation Organization—but the bulk of the interactions in the data sets involve nation-states.

¹² Azar, in contrast, saw event data fundamentally in terms of numerical measures; see for example Azar and Ben-Dak (1975). Nonetheless, virtually all event coding schemes other than COPDAB and its derivatives (e.g. GEDS) use categorical coding.