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A PROCEDURE FOR MONITORING INTERNATIONAL INTERACTION. (U)  
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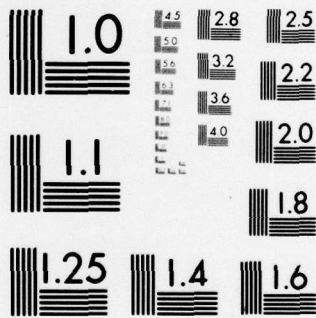
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PRELIMINARY REPORT ON A PROCEDURE FOR MONITORING INTERNATIONAL INTERACTIONS

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University of Southern California  
November 15, 1970

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This paper is the first in a series of reports to be issued by the World Event/Interaction Survey summarizing the status of <sup>the</sup> our development of procedures to monitor international interaction on a monthly basis.

During the past year, the WEIS project has issued detailed analyses of its data on a six month basis. These biannual reports provide summarizations of the interaction for each of the 160 political entities included in the WEIS project data, and concentrate on the identification of recurring patterns of international behavior present in the international system, and in specific conflict arenas. The new monthly status reports are intended to supplement the reporting procedures initiated in the biannual analyses, which will continue to be issued.

The monthly status reports are an integral part of the monitoring and predictive activity being undertaken by the World Event/Interaction Survey in the 1970-71 contract period.<sup>2</sup> As outlined in the program plan for the current year, one of the major tasks to be undertaken is the development of a computerized monitoring system of international interaction. This activity is based on our prior experience in developing and evaluating indicators sensitive to changes in the activity of specific countries engaged in international interaction, and is intended to provide monthly summaries of those countries which have changed their international activity in a manner not reflected in their past performance.

Our plan is to develop a monitoring system of ongoing international interaction, in conjunction with investigations of interaction processes in previous conflict situations and development of analytic techniques and procedures for prediction of interaction outcomes (such as time series analysis and probability-based computer simulation models) in order to provide

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> the capability to identify, at an early stage, the development of conflict processes in the ongoing stream of interaction data, and to predict the outcome of interaction processes. ←

Because the World Event/Interaction Survey data are collected from daily newspaper sources, no assertion is made that our data represent an accurate account of the behavior of countries in all of their international interaction. The assumption underlying our research strategy is, rather, that our data provide indicators of the activity occurring in international interaction, which provide a basis for statistical characterization of the past activity of a given country, and provide the opportunity to compare current with past activity to determine the degree of continuity present in their behavior.

Previous studies of interaction phenomena in conflict and crisis situations indicate that the occurrence of such situations produces substantial departures from the non-crisis or "normal" level of interaction in which a country is engaged.<sup>3</sup> In addition, our initial experience in evaluating the feasibility of developing a monitoring system of ongoing international interaction, based on the indicator data of the WEIS project, concluded that early warnings of changes in activity levels and behavioral types are emitted by countries prior to their involvement in conflict situations.<sup>4</sup>

The initial evaluation involved an analysis of the sensitivity of the indicator data to detect changes in the activity of the participants in the June, 1967 Middle East conflict and the August, 1968 Czechoslovakian intervention by the Soviet Union, prior to the outbreak of hostilities. In each case simple statistical measures of past performance were derived from the indicator data and recalculated on a monthly basis prior to the conflicts. In the Middle East case changes in past performance were detected as early as May 26, 1967 and May 28, 1967 for the United Arab Republic and Israel respectively. The sensitivity of the indicator data in detecting changes in international activity was even more impressive in the Czechoslovakian intervention. Significant changes in Czechoslovakian activity were detected six months prior to the conflict, and the Soviet Union exhibited a significant departure from its prior behavior as early as three months prior to the intervention. In each case significant changes in behavior continued

to be detected in the months between the initial indication of unusual activity and the occurrence of the conflict. The initial study also detected similar "early warnings" in the activity of other countries to which the two conflicts were particularly salient due to geographical or ideological proximity to the major adversaries.

Because the initial investigation demonstrated that significant deviations occurring in the interactions of specific countries can be identified through systematic investigations of past performance, the decision was made to incorporate the rather simple statistical procedures utilized in the original study in our initial efforts to develop procedures for monitoring our data. The procedure basically involves measuring current behavior against a standard derived from past behavior of countries in their interaction with each other. The occurrence of a significant deviation from expected levels of activity derived from past behavior provides information on which countries are engaged in abnormal activity that should be further investigated to identify where potential conflict situations may arise in the near future.

The mean and standard deviation are the most common summary measures used to characterize any set of data. They have been used here to summarize the past behavior of countries, and as the standard against which current behavior is evaluated to determine if it deviates substantially from past performance. By computation of the mean and standard deviation of the activity of a given country distributed over time, and comparison of standardized values for each month with the probabilities associated with such values when normally distributed, an expected range of behavior can be derived against which specific values for given time periods can be tested for significant deviation. The major statistical requirement is that the distribution of each country's data at least approximate a normal distribution. Because of the preliminary nature of this report, detailed investigations of the extent to which all countries included meet that requirement have not been undertaken. The November status report will include the results of such an analysis, and the data transformations used to meet this requirement.

The important consideration for the simple monitoring procedure reported here is that the use of the mean, standard deviation, and associated Z scores provides an easily obtained criterion which will identify statis-

tically significant deviations from past behavior. The criterion used here is 2.0 standard deviation units from the mean of each country's past behavior. This criterion identifies those deviations which have less than a .05 probability of resulting from random fluctuation in the activity of the country being monitored.

It should be noted that the results reported below are based on data which represent only the total volume of activity originated and received by the 118 political entities included in the preliminary monitoring system. Countries which do not account for at least .05 percent of the data of the WEIS project in the past 57 months are grouped together by geographical region to provide monitoring of low-activity countries in aggregated form. The resulting monitoring system accounts for 78 percent of the 34,273 events collected by the WEIS project to date. The remaining 22 percent of the data, representing activity not directed to a specific recipient (mostly from the WEIS Comment category), was deleted from the monitoring procedure to eliminate that part of the data considered to be most susceptible to reporting bias in the sources of our data collection. Future status reports on the monitoring procedure will incorporate additional variables outlined in the last section of the report.

Because of the preliminary nature of this report, no attempt has been made to analyze the relationships in the data presented or to predict future international activity. Significant deviations from past performance, occurring in September and October, 1970 are identified and discussed, and the sensitivity of the monitoring procedure to the detection of changes in international activity is evaluated.

The monthly frequency of activity originated and received by each of the 118 political entities included in the monitoring system was summarized and organized into easily accessible computer-stored files. The mean and standard deviation for each distribution were calculated for the 56 month period from January, 1966 through August, 1970. Past performance characteristics and the criteria for significant deviations, outlined above, were calculated for each variable based on the 56 month data base. The data for September were checked against the previous behavior to identify where significant deviations had occurred. More detailed queries of both the analytic

and descriptive files of the WEIS data collection were then made to identify the reasons for the occurrence of the deviations.

The mean, standard deviation, and criterion for significant deviation were then recomputed for each variable based on the 57 month period from January, 1966 through September, 1970. The October data were evaluated on the basis of the expanded data base to identify significant deviations occurring in October. Detailed queries of the WEIS collection were repeated for each significant deviation, as had been done for September. The monitoring procedure is thus based on a progressive recalculation of past performance characteristics, in order to include the activity occurring in the month just prior to the time period being monitored.

The significant deviations identified by this monitoring procedure in September and October are outlined in Table 1. The deviations for September are dominated by those resulting from the international activity generated by the Arab Commando airliner hijackings and the Jordanian civil war. The occurrence of those deviations is patently obvious to anyone who had access to a source of information on international affairs during the month of September, and it may be considered frivolous to deal with the situation at length. It does, however, demonstrate the sensitivity of the monitoring procedure to detect significant changes in the activity originated (output) and received (intake) by countries not directly involved in the situation. In addition to the obvious deviations from past performance by the Arab Commandos and Jordan, the repercussions of the situation for other countries' international activity is interesting. The deviations for the Arab League, Switzerland, Sudan, Libya, Syria, the United Kingdom, and Kuwait were totally the result of their interaction regarding the situation, and the deviations for multilateral group activity, the United States, the United Nations, and the United Arab Republic at least partially resulted from their response to the situation. It should be noted that Syria's intervention in the Jordanian civil war did not represent a significant departure from its past output of activity, but that the response to the intervention by other countries (especially the U.S.) represented a significant deviation from past Syrian intake of activity.

Arab Commando activity in the 58 months of the WEIS data collection

Table 1  
Rank Order of Deviations  
from Previous Behavior

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September

<u>Output</u>		<u>Intake</u>	
Arab Commandos	13.11	Jordan	18.07
Arab League	11.87	Arab Commandos	13.76
Jordan	10.73	Arab League	8.96
Switzerland	8.56	Switzerland	8.57
Multilateral Group	6.45	Mauritania	5.90
Mauritania	4.85	Multilateral Group	3.77
Sudan	4.65	United Nations	3.42
Libya	4.16	Syria	3.12
USA	3.60	Italy	2.96
Morocco	2.86	EEC	2.86
United Nations	2.80	USA	2.63
Norway	2.80	United Arab Republic	2.54
EEC	2.74	Morocco	2.21
United Kingdom	2.66		
United Arab Republic	2.61		
OAU	2.56		
Panama	2.34		
Denmark	2.33		
Ethiopia	2.21		
Kuwait	2.14		

October

<u>Output</u>		<u>Intake</u>	
Taiwan	5.69	United Nations	5.13
USSR	3.88	Turkey	4.65
USA	3.76	USA	3.80
Afghanistan	3.07	Bolivia	3.02
Nepal	2.25	USSR	2.52
Tunisia	2.11	North Vietnam	2.21
North Vietnam	2.03	Canada	2.04



is outlined in Figure 1. Standardized scores based on the 57 month distribution (including the September activity in the calculations) are presented to allow comparison of the October data with past performance. The Arab Commandos directed activity to a total of 15 countries in September and utilized 17 of the 22 types of behavior coded by the WEIS project. It received activity from 20 countries made up of 17 different types of behavior. Fifty-four percent of its output and 51 percent of its intake of activity involved Jordan. The use of Force behavior accounted for 29 percent of Commando output and 28 percent of its intake in September.

Jordanian activity is presented in Figure 2, on the same standardized-score basis as the Commando activity. Jordan directed 80 percent of its September output to the Commandos and received 55 percent of its intake from them. Force, consultation, and accusation dominate the 19 types of behavior originated and received by Jordan in September.

More detailed investigation reveals that had the monitoring procedures reported here been in use on the data prior to September, the first indication of significant Commando deviation from past behavior in 1970 would have been obtained in June for their output. Both Jordanian and Commando output and intake of activity would have been identified as significantly different from past behavior in August. Figure 3 outlines the daily frequency of output for Jordanian and Commando activity in September and October. Counted cumulatively the data reveal that the Commandos exceeded the criterion for significant deviation from past behavior on September 7, and that Jordan exceeded its past performance characteristics on September 11.

The significant deviations for the United Arab Republic in September result primarily from the Jordanian civil war and interaction pertaining to the Middle East cease fire. UAR output in September was made up of 15 types of behavior. The United States (34%) and Jordan (18%) dominate the 11 countries to which the UAR directed its activity. UAR activity directed to the United States was made up of 89.5 percent conflictful types of behavior. UAR activity during the 58 months of the WEIS data is outlined in standardized form in Figure 4. It shows that October activity does not reflect a significant deviation from past performance. The death of President Nasser, accompanied by the establishment of a new government may be responsible for

Figure 1

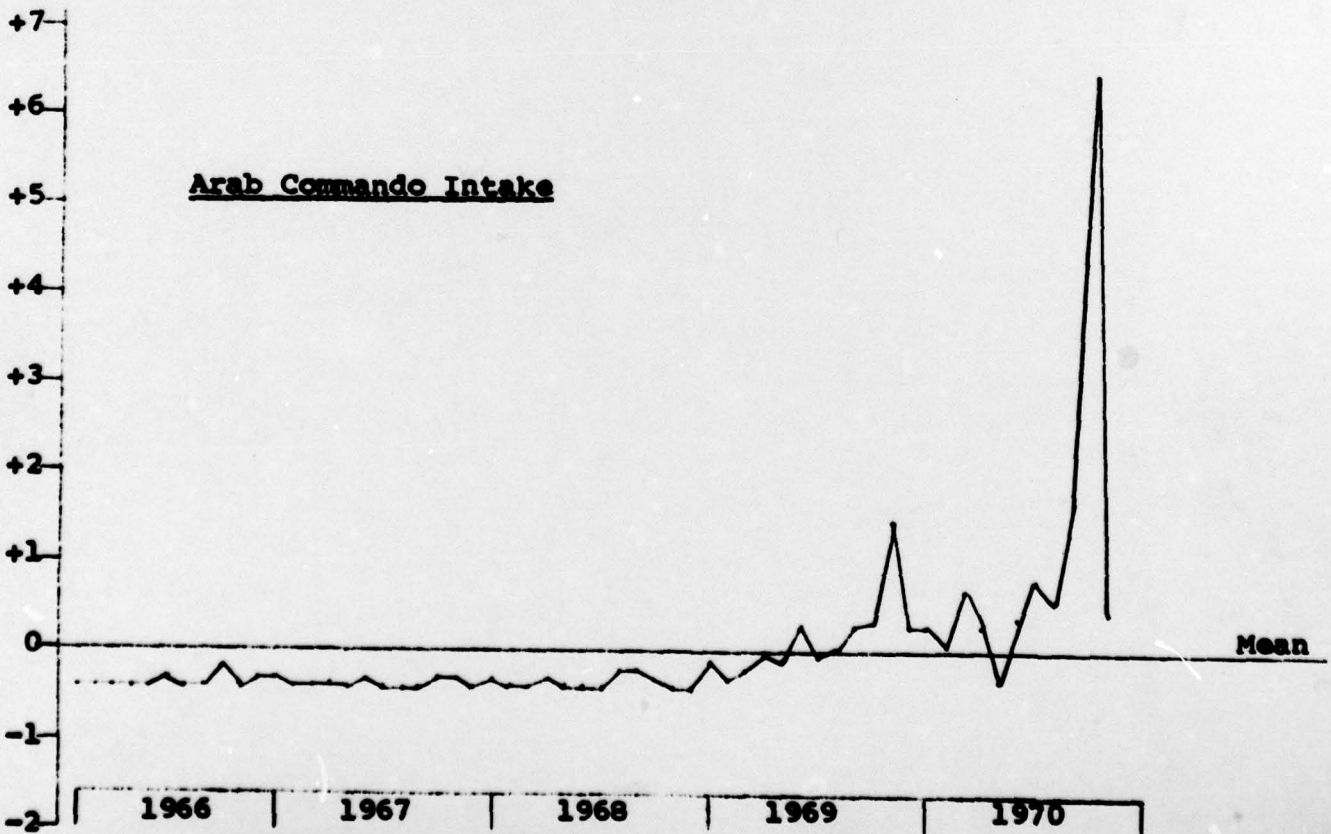
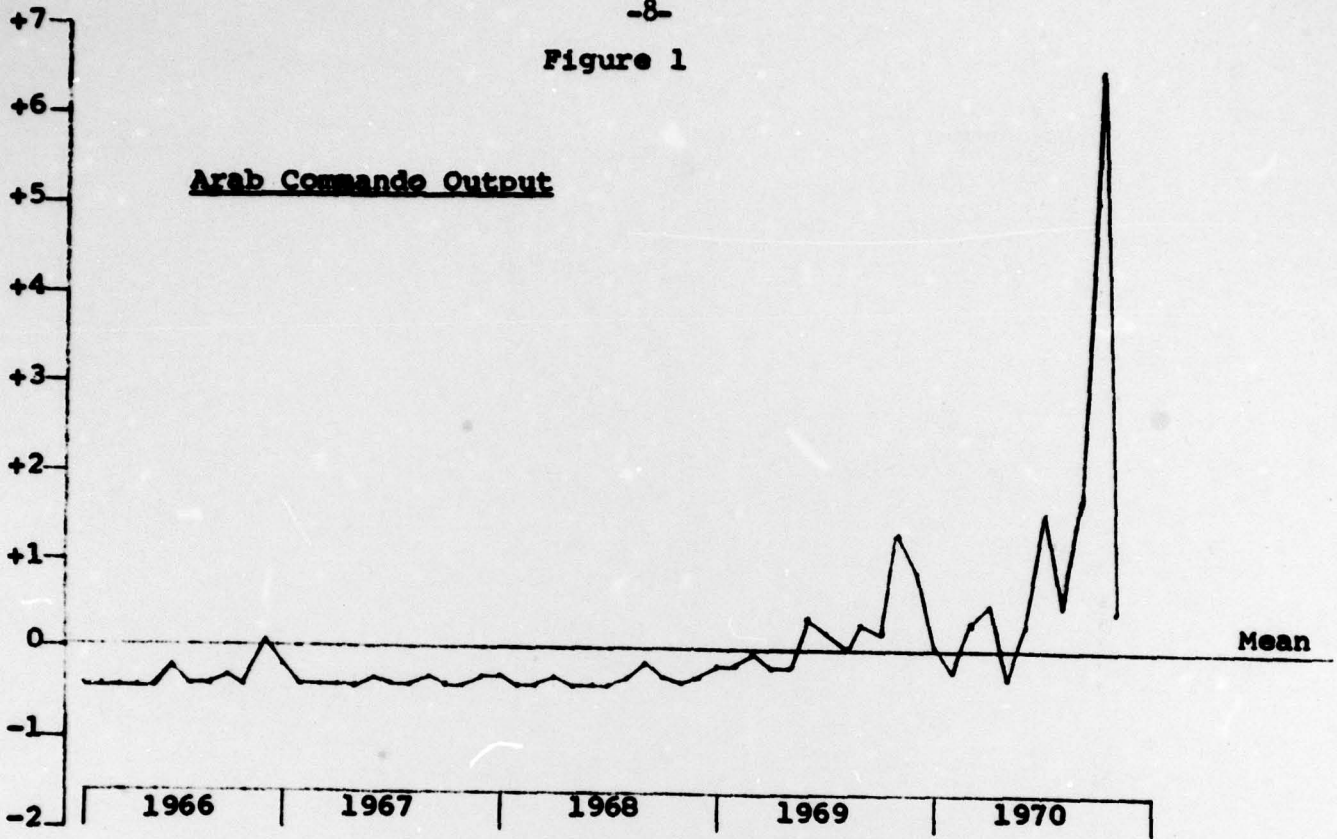


Figure 2

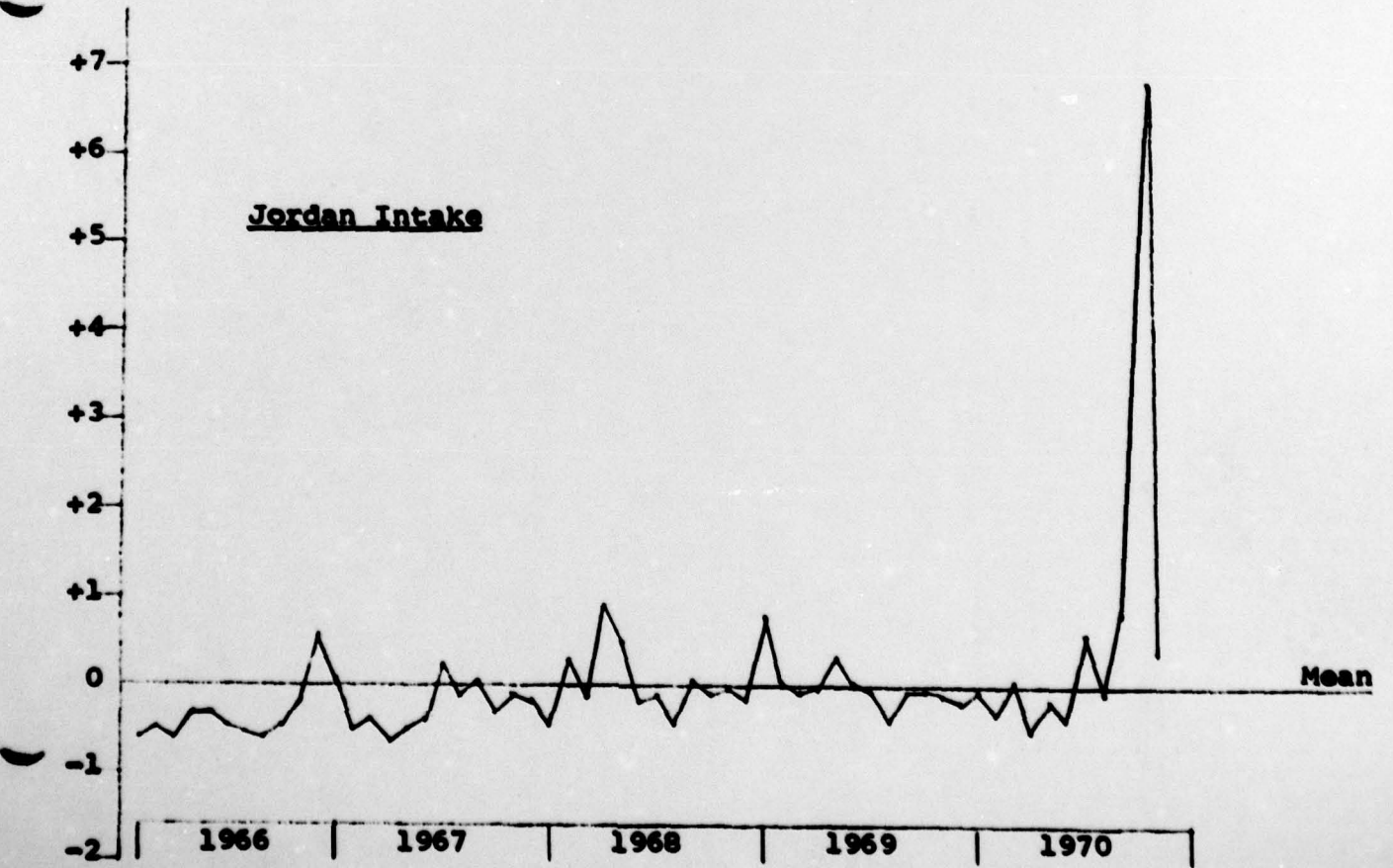
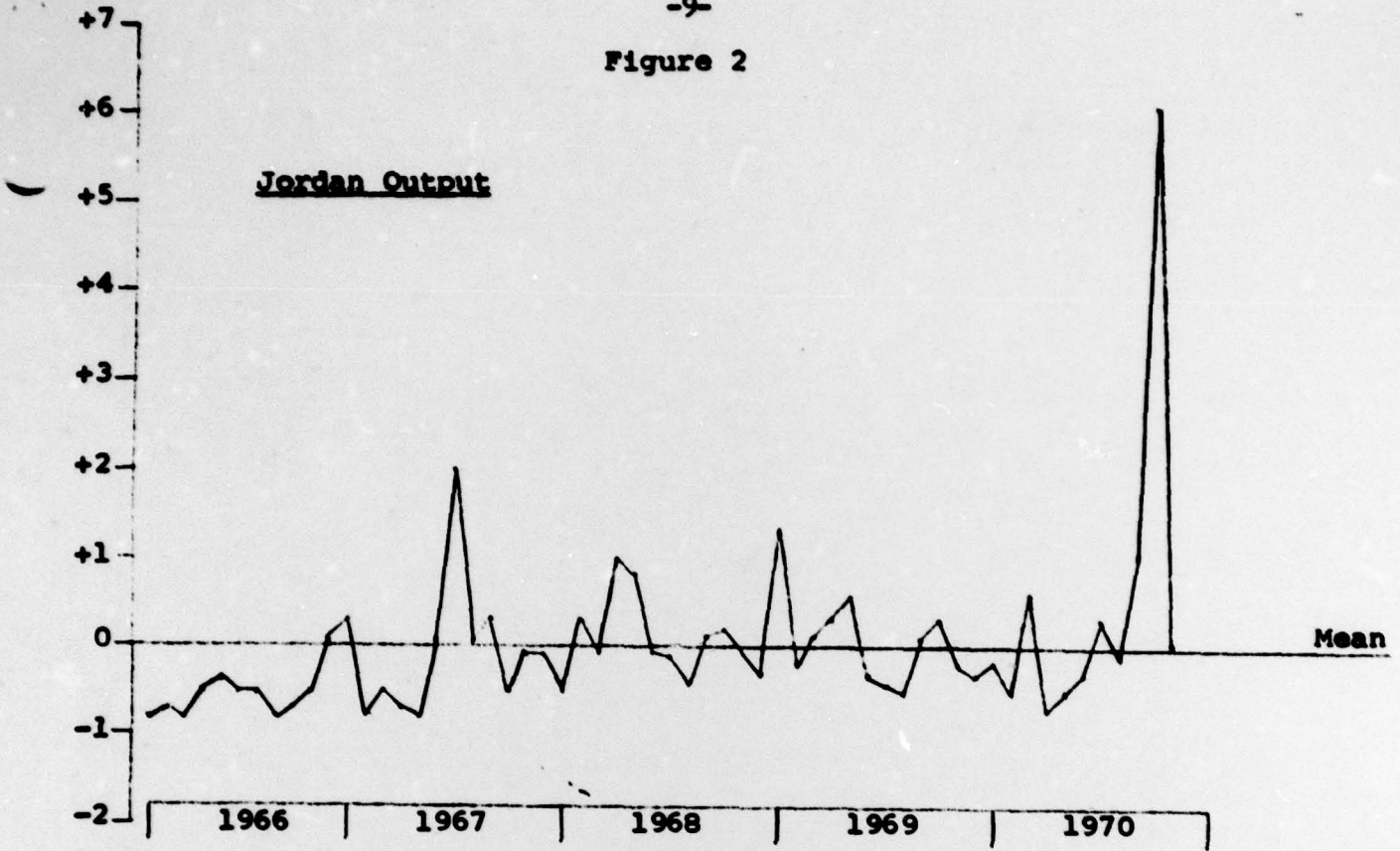
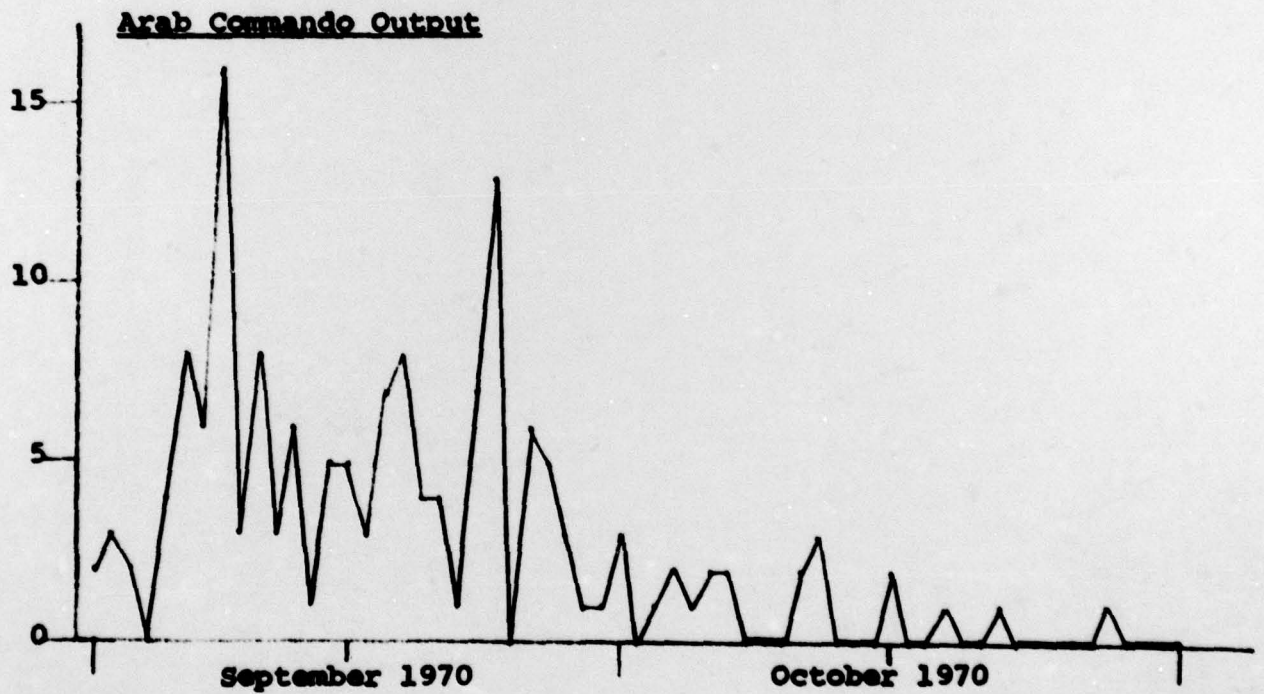
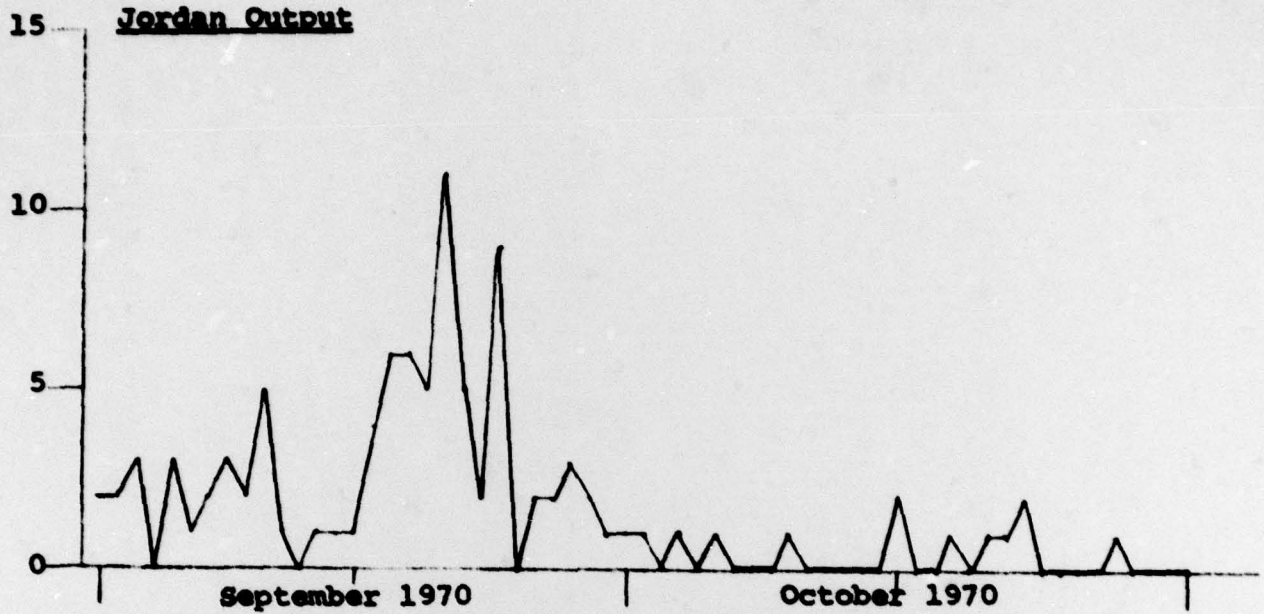
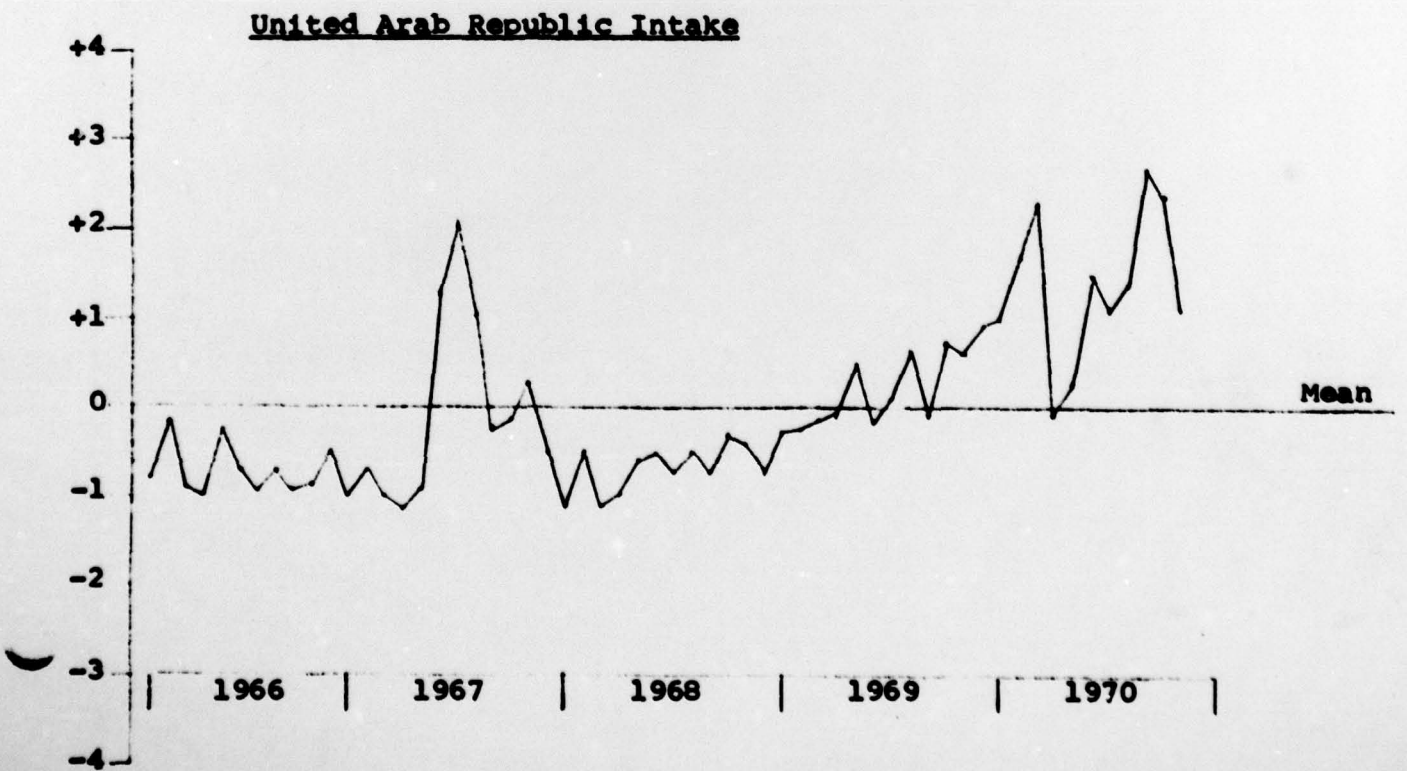
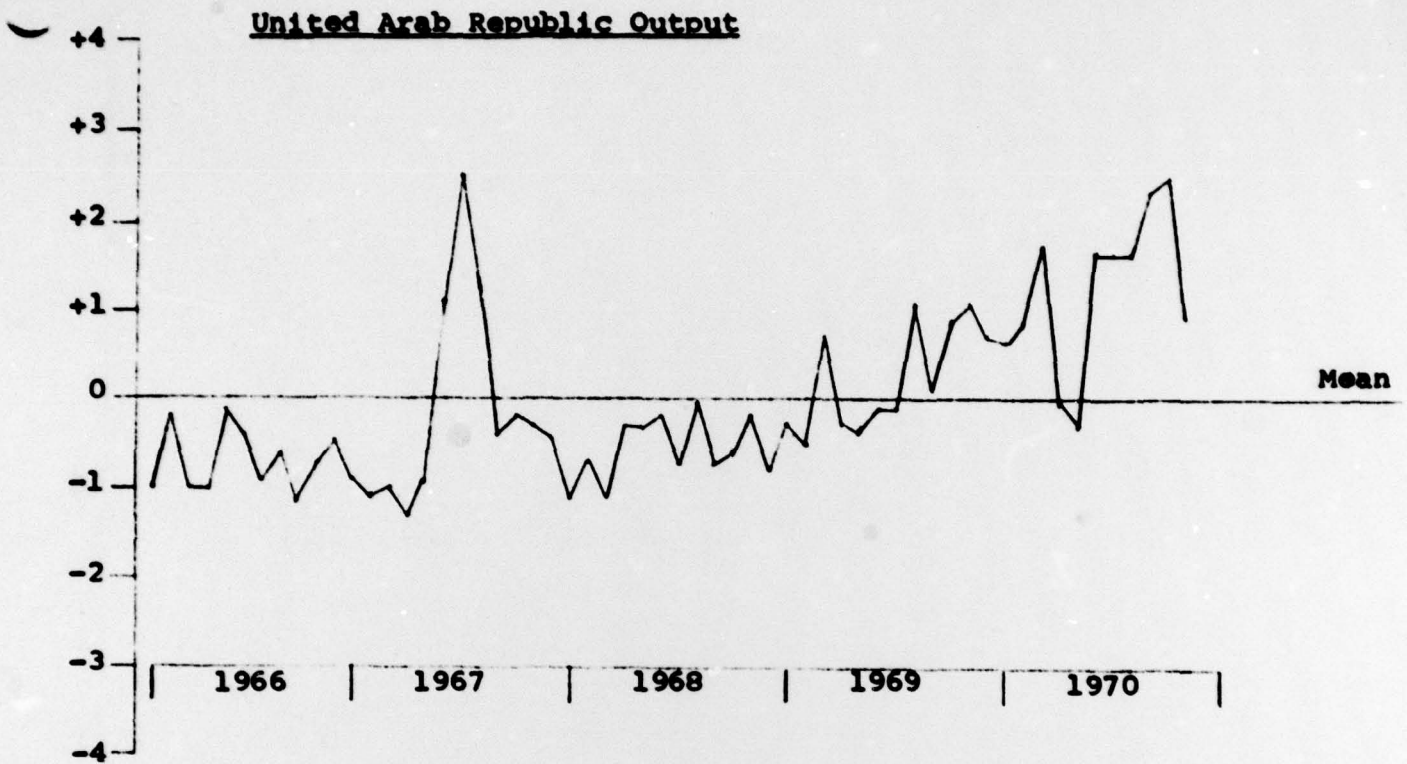


Figure 3



Daily Frequency of Activity Pertaining to Arab Commando Hijackings and Jordanian Civil War September - October 1970

Figure 4



the decline in interaction evident in October. The change in government provides the opportunity to compare the activity of the new regime with Nasser's as the monitoring procedures are further developed.

The significant September deviations listed in Table 1 for Mauritania, Morocco, the OAU, and Ethiopia result from the African summit conference in Addis Ababa. The significant deviations for the EEC, Norway, and Denmark result from their discussions on membership in the EEC and its policy on fishing interests. The Panamanian deviation from past behavior is the result of U.S./Panama discussions on draft treaties dealing with new canal routes.

The United Nations activity, outlined in Figure 5, shows significant deviations from past performance in both origination and receipt of activity in September, and for intake in October. The September deviations result from the Commando hijackings, the Jordanian civil war, and interaction pertaining to the 25th anniversary celebration and the opening of the General Assembly, to the relatively high levels of activity evident since August.

The significant deviations for the United States for both output and intake in September are the result of interaction by the U.S. in a number of areas. The September deviations result from U.S. activity in regard to the Commando hijackings and the Jordanian civil war, President Nixon's trip to Europe, and U.S. activity in Indochina. United States activity, outlined in Figure 6, was directed to a total of 33 countries in September, dominated by North Vietnam (17%), Israel (8.5%), and the Soviet Union and South Vietnam (7.7% each). The activity with the Soviet Union was primarily directed to seeking their aid in attaining negotiations on the Middle East and dissolution of the Jordanian civil war. The United States utilized 21 types of behavior in September, concentrating on consultation (21%), use of military force (19%), and the granting of aid (8.4%) to Cambodia, Jordan and South Vietnam. A total of 31 countries directed behavior to the U.S. in September, with North Vietnam (13%), the Soviet Union (9.7%), and the Arab Commandos (7.6%) accounting for most of the activity. The United States received 18 types of behavior in September, dominated by consultation (21%), accusation (19%), and the use of military force (17%).

U.S. deviations in October reflect the last part of President Nixon's trip; his speech on October 7, proposing a cease fire in Vietnam; continued

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Figure 5

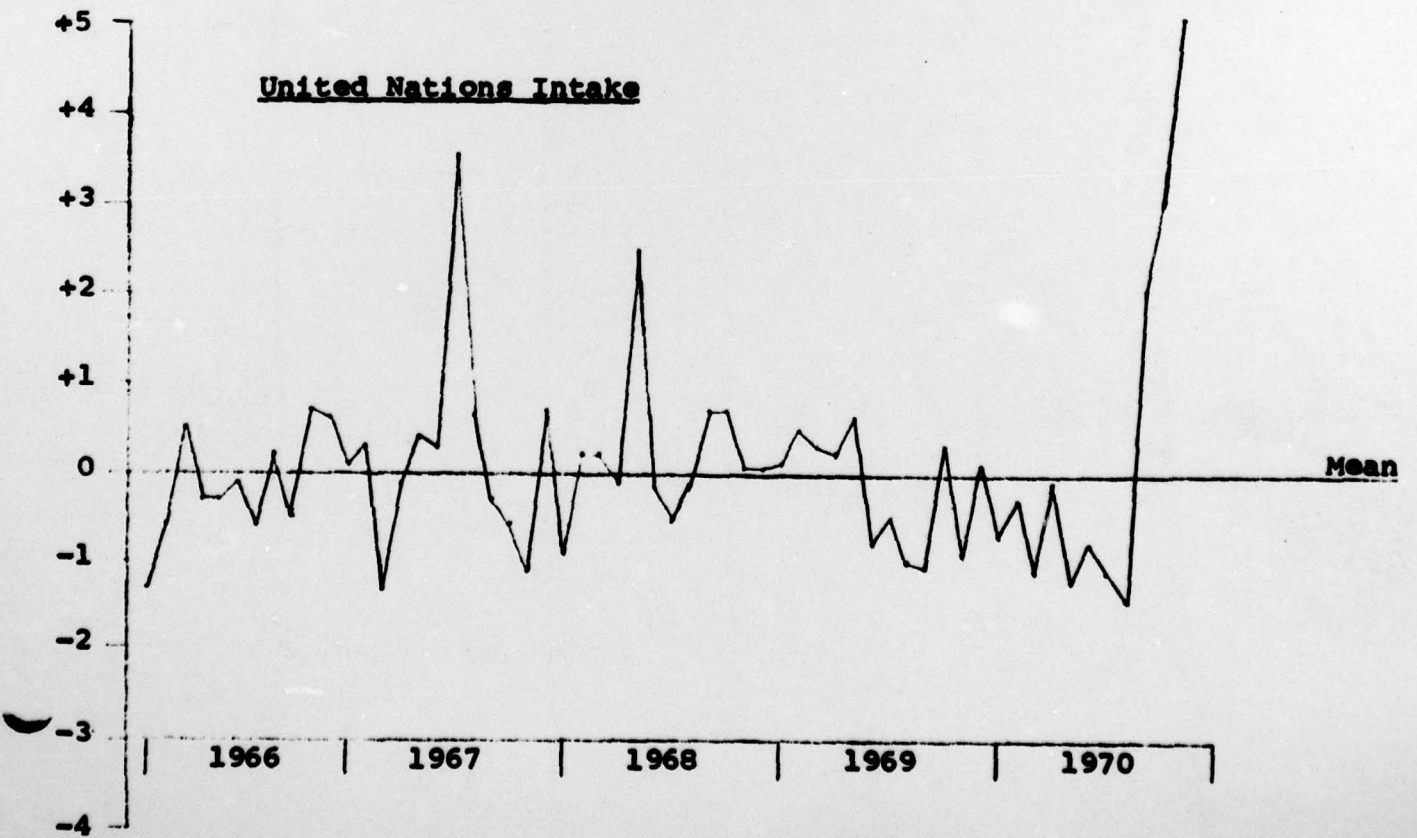
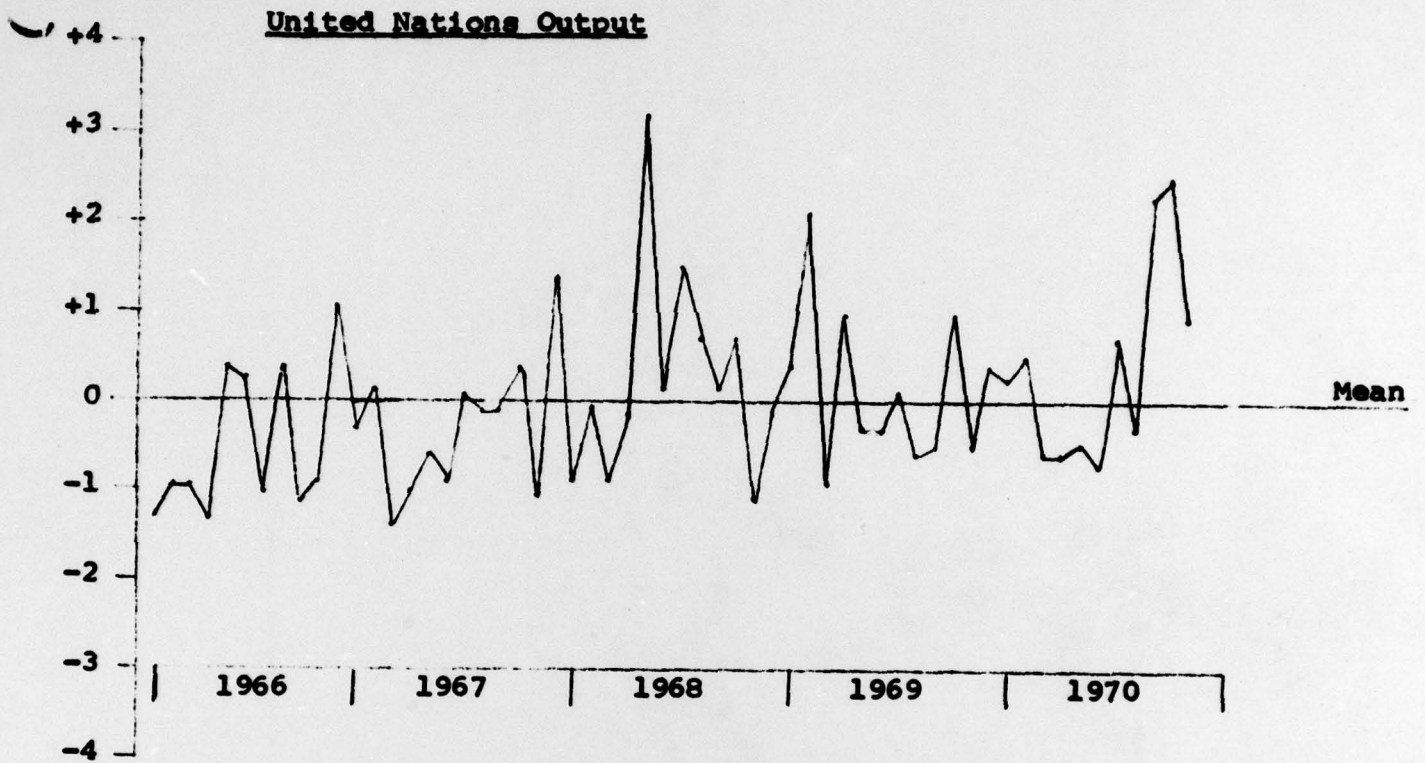
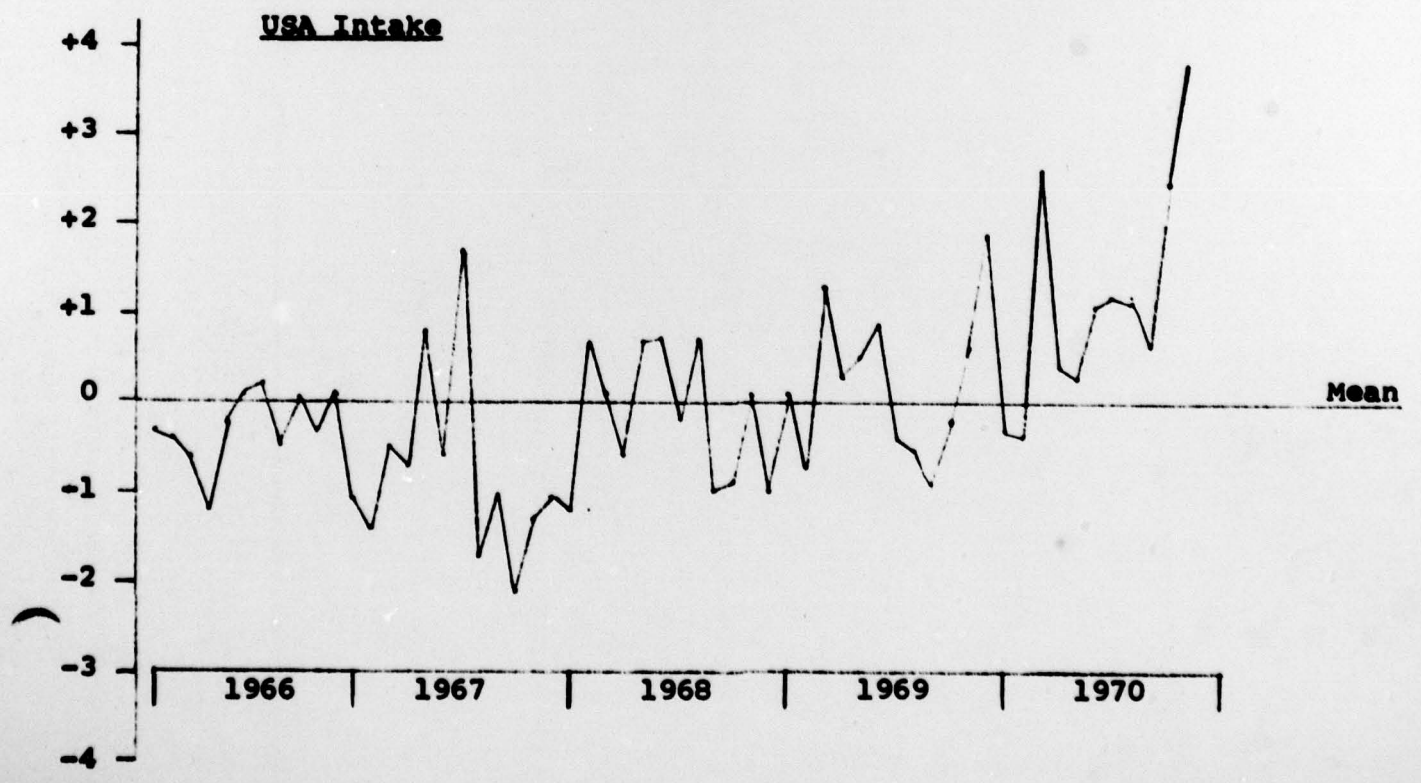
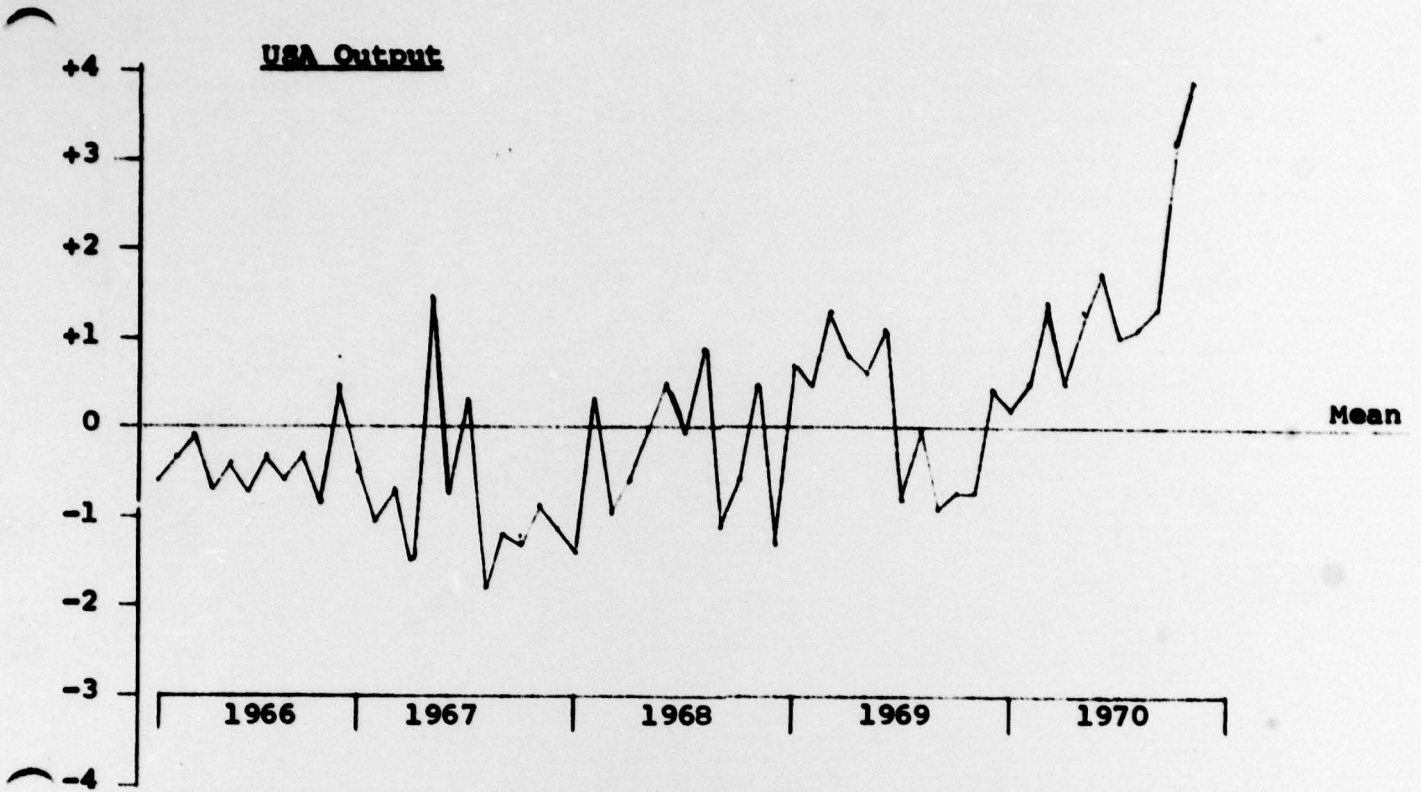


Figure 6





activity regarding a settlement in the Middle East; and interaction with the Soviet Union regarding Berlin, their naval activity in Cuba, and their detention of two U.S. generals. The proportions of activity remain about constant from September, with the exception that the Soviet Union accounts for 22 percent of U.S. output and 25 percent of its intake in October. Review of the last two years of Table 6 indicates that if a "low profile" in foreign policy has existed in the Nixon administration, it was only during the last half of 1969, with more recent months exhibiting increased international activity.

The activity surrounding the detention by the Soviet Union of U.S. and Turkish military personnel in October is evident by the significant deviations from past performance by both the Soviet Union and Turkey. Interaction originated by Turkey does not represent a significant deviation from its past output of activity, but the activity it received from the Soviet Union does represent a significant departure from past behavior received. The deviations in the October activity of the Soviet Union, outlined in Figure 7, reflect more, however, than just the increased interaction with Turkey and the United States.

The Soviet Union directed activity to 18 countries, and utilized 17 types of behavior in October. The U.S. (45%) and Israel (19%) dominated their behavior which primarily consisted of accusations (23%), consultations (22%), and requests (10%). The high proportion of consultations results from their diplomatic activities at the funeral of UAR President Nasser, and at the opening of the United Nations General Assembly. The U.S. dominated the activity received by the Soviet Union in October, followed by France.

The deviations for Taiwan output and Canadian intake in October reflect Taiwan's activity directed to Canada following Canada's recognition of China. Afghanistan and Nepal's significant deviations in October consist of their activities in the United Nations General Assembly. Tunisia's deviation reflects its activities directed to the Arab Commandos and Jordan. The significant deviation of Bolivian intake of interaction results from U.S. activity in October directed to the new Bolivian regime.

The October North Vietnamese deviations from past behavior, outlined in Figure 8, result from President Nixon's proposal for a cease fire

Figure 7

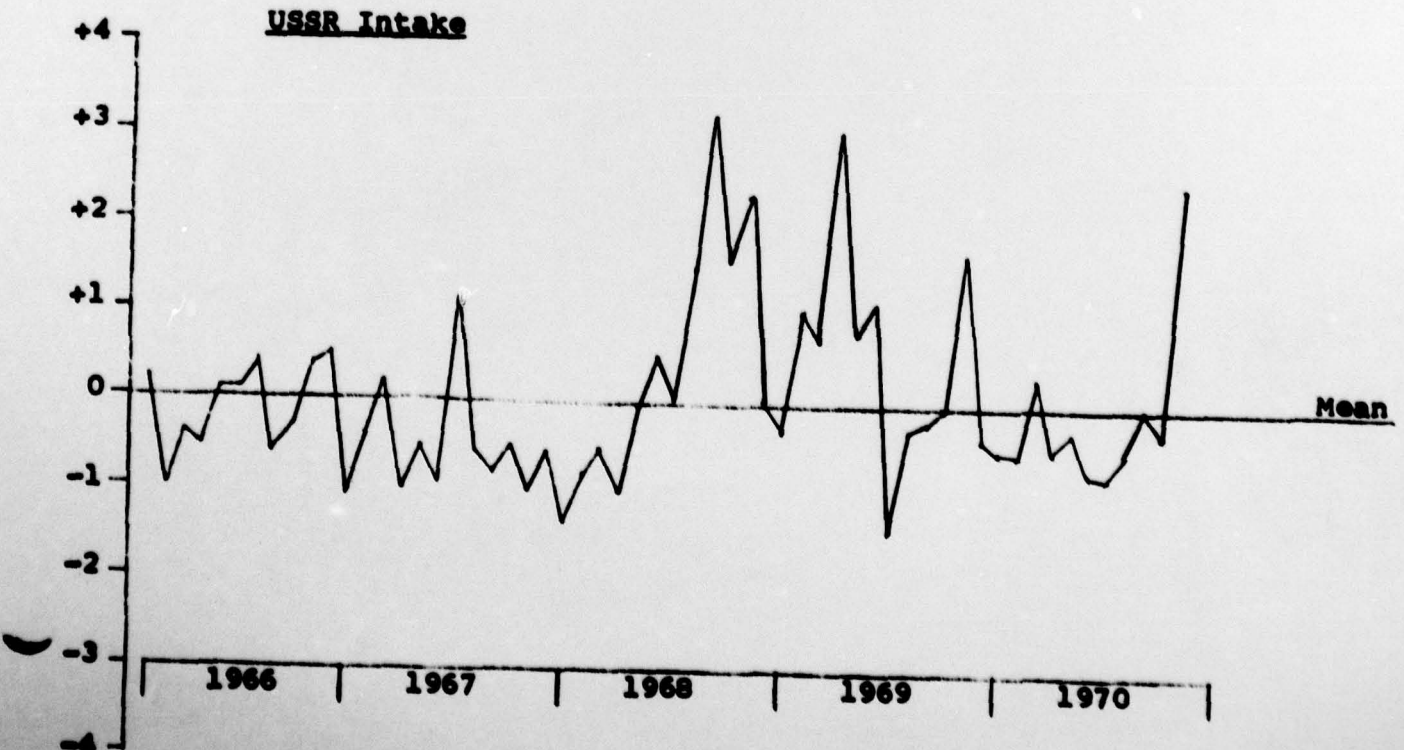
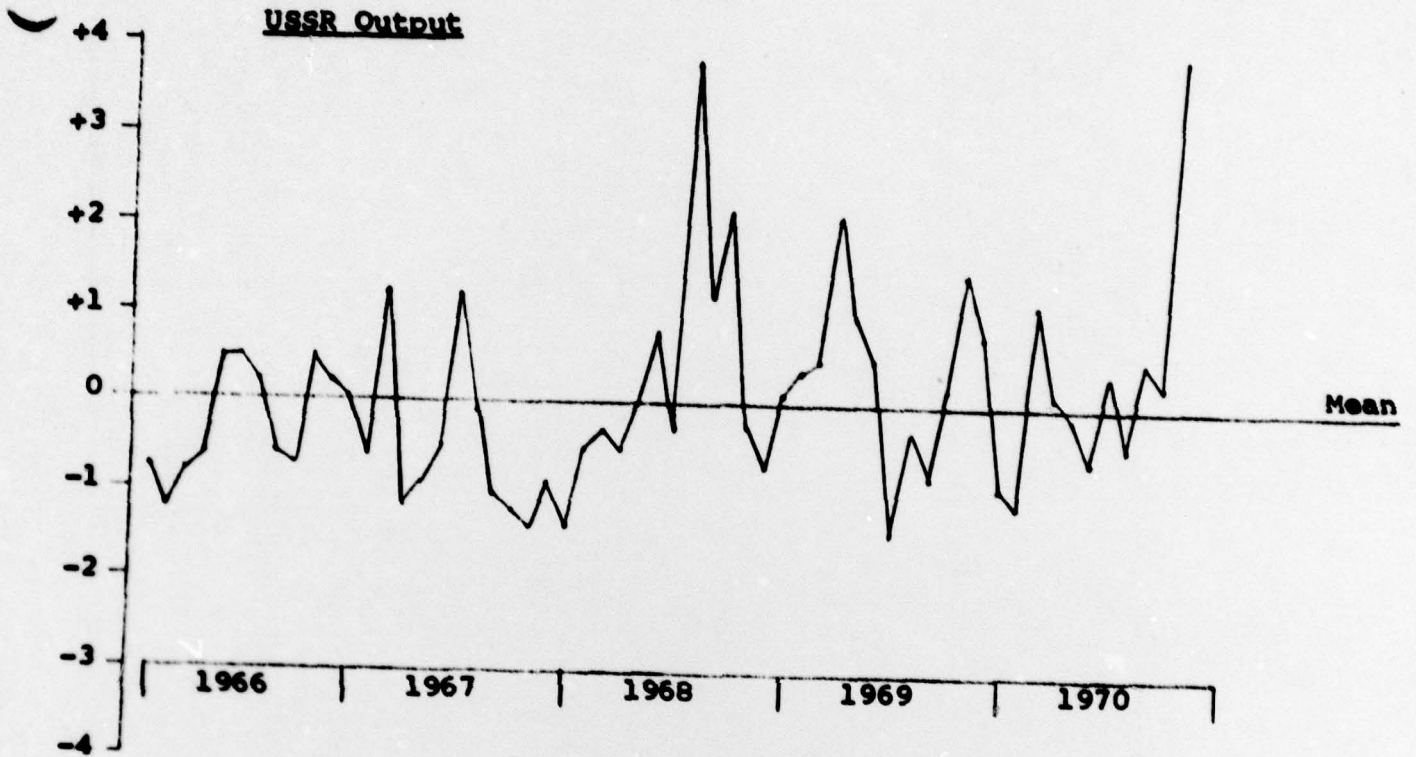
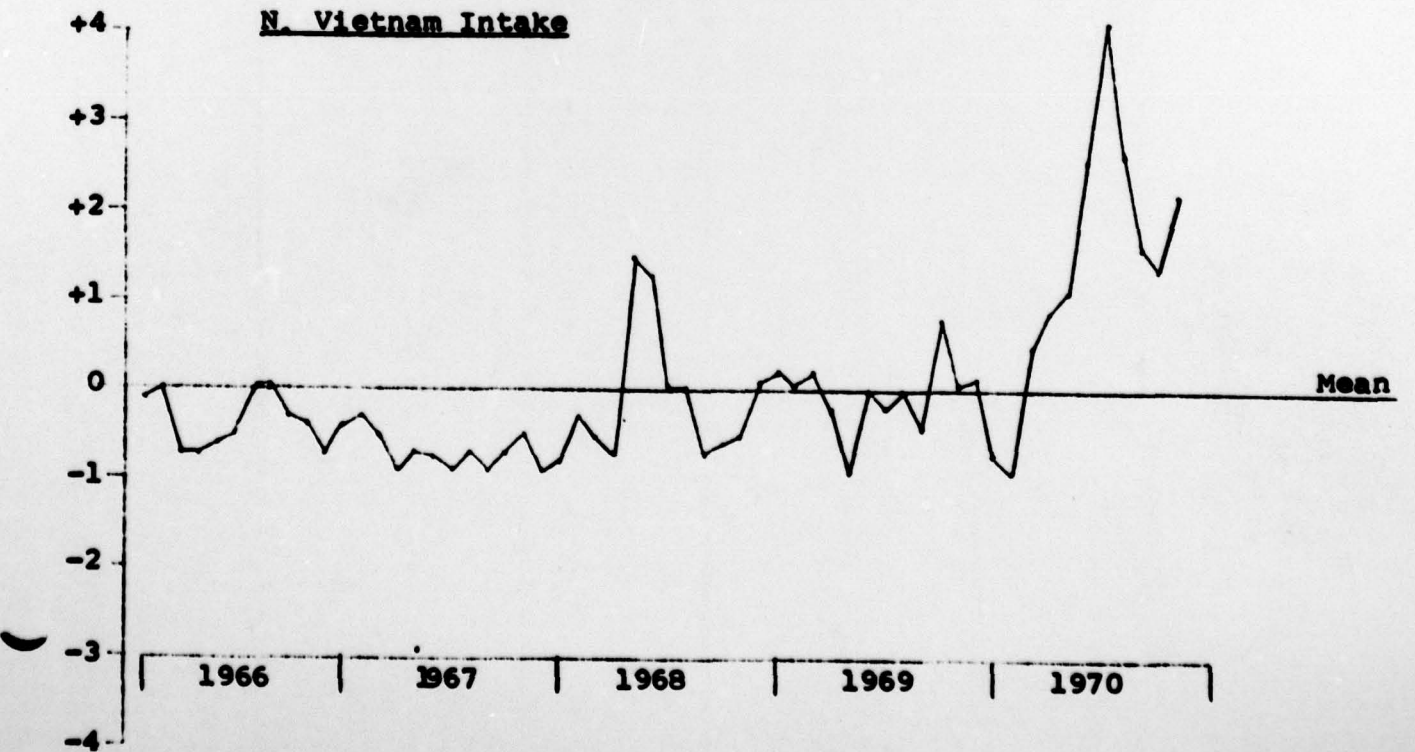
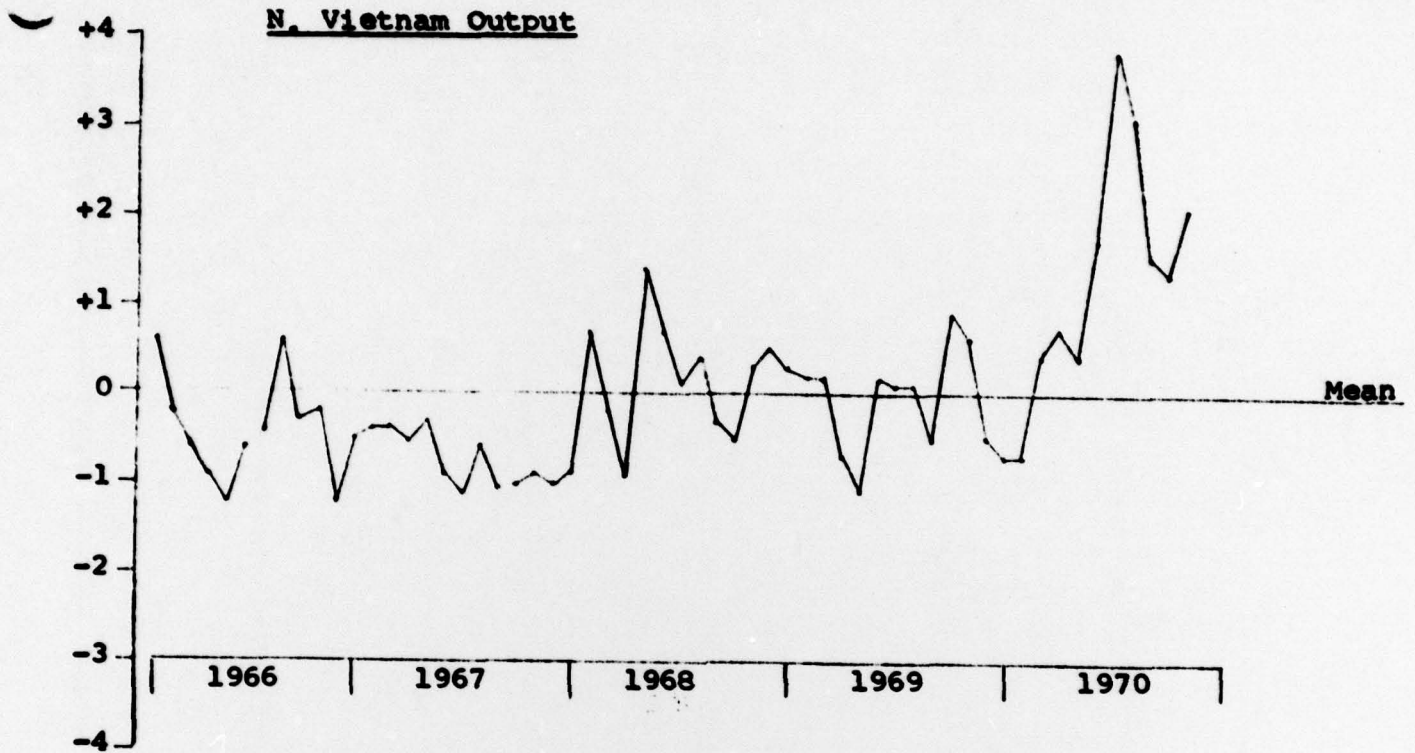
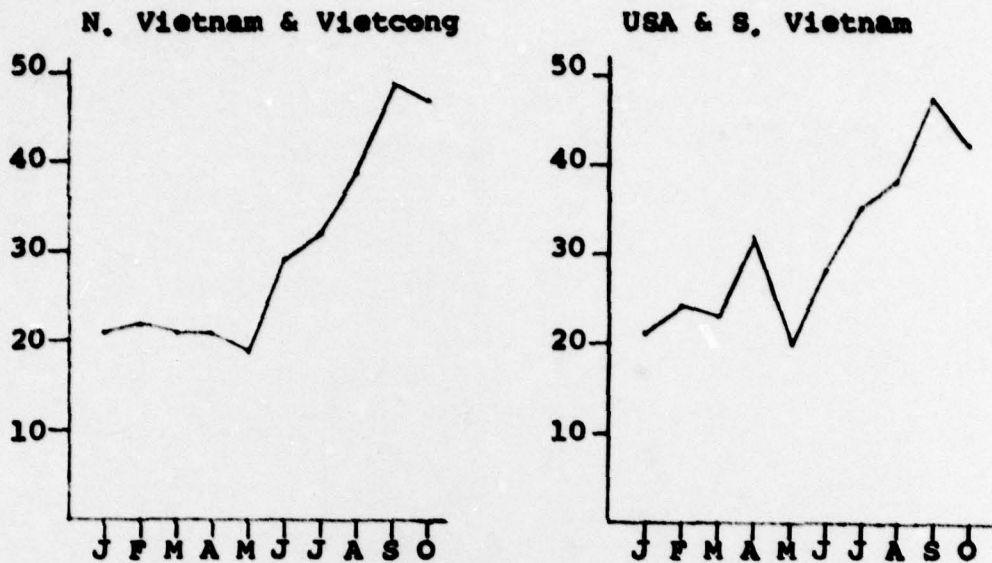


Figure 8



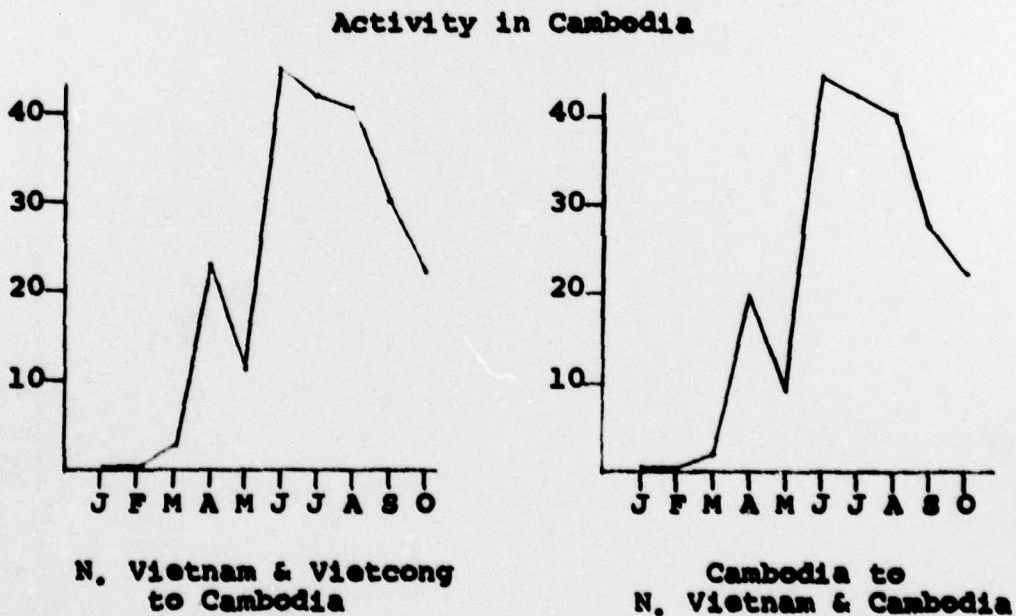
in Vietnam and the resulting interaction at the Paris peace talks. North Vietnamese activity remains dominated by Force behavior (51% of output and 66% of intake). Cambodia, the United States, and South Vietnam continue to command most of its attention. Two-thirds of the activity North Vietnam directed to the U.S. in October consists of accusations and rejections in response to Nixon's October 7 speech. North Vietnam's interaction with Cambodia and South Vietnam is almost exclusively military force behavior. Figure 9 summarizes 1970 interaction in Indochina. Military engagements in Vietnam increased in September and declined slightly in October. Similar data for November should provide additional information on whether the deviations for North Vietnam indicate an increase in military activity following the monsoon season, or increased diplomatic activity regarding the peace proposals. The activity between Cambodia and the North Vietnamese and Vietcong continues to decline, following a substantial decrease in September.

This review of those countries exhibiting significant deviations from past behavior during the months of September and October, while perhaps not insightful into areas where future conflict may occur, does provide some preliminary indications of the feasibility of applying the simple monitoring procedures outlined above to ongoing international interaction. It indicates the sensitivity of the procedure to the identification of significant deviations from past behavior in a variety of interaction situations. The highest deviation identified in the initial feasibility study was 8.3 standard deviations recorded for Israel in June, 1967. The unusually high deviations reported here for the Arab Commandos and Jordan in September provide evidence that the procedure may be extremely sensitive to the magnitude of changes in interaction. It is encouraging that the procedures seem sensitive to indicating change for such diverse interaction situations as membership discussions between Norway and Denmark and the EEC, Panama's treaty discussions with the U.S., the African summit conference, and the change in the Bolivian government. It is equally encouraging that the procedures seem to provide selective indications of deviations from past performance, like the Syrian, Turkish, and Bolivian deviations for intake, but not output; and the deviations for Taiwan output and Canadian intake resulting from the latter's recognition of China.



Military Engagements in Vietnam

Figure 9  
1970 Interaction in Indochina



Other variables will be added as the monitoring system is further developed. Three priority tasks are planned in the next month, as follows:

1. Investigation of the extent to which the WEIS project indicator data meet the assumptions of normal distribution required by the procedure, and identification of appropriate transformations to meet those assumptions.
2. Addition of output and intake variables for both conflictful and cooperative types of behavior, based on the WEIS category system.
3. Reorganization of the computer-stored files to allow easy selection of the time periods to be included in future analyses. It may be possible to increase the sensitivity of the procedures by basing past performance characteristics and criteria for significant deviations on more recent international activity, rather than the entire WEIS data collection. The capability for flexible manipulation of the data files will allow comparison of current activity with various time periods in a country's past performance.

Variables planned for future evaluation for possible inclusion in the monitoring procedure include the information statistic Hrel, used by McClelland to measure the amount of variety in international behavior;<sup>5</sup> measures of the scope of monthly activity for each country; and the degree of reciprocity present in output and intake of activity, for each country where the volume of interaction is large enough to allow their computation.

FOOTNOTES

1. See Charles A. McClelland and Robert A. Young, "The Flow of International Events, July-December, 1969", World Event/Interaction Survey Interim Technical Report, University of Southern California, January 1970, and Wayne R. Martin, "The Flow of International Events, January-June, 1970", World Event/Interaction Survey Annual Technical Report, University of Southern California, July 1970. Both prepared in support of Office of Naval Research contract #N00014-67-A-0269-0004. This paper assumes a reader familiarity with the World Event/Interaction Survey. The coding procedure and theoretical assumptions of the project are outlined in Barbara J. Fitzsimmons, et al. World Event/Interaction Survey Handbook and Codebook. World Event/Interaction Survey Technical Report #1, University of Southern California, January 1969; and Charles A. McClelland, International Interaction Analysis: Basic Research and Some Practical Applications. World Event/Interaction Survey Technical Report #2, University of Southern California, November 1968.
2. See "World Event/Interaction Survey Program Plan, 1970-1971", September, 1970.
3. Charles A. McClelland, "Access to Berlin: The Quantity and Variety of Events, 1948-1963," in J. David Singer, ed., Quantitative International Politics, (New York: The Free Press, 1968) pp. 159-186; Charles A. McClelland, "The Beginning, Duration and Abatement of International Crises: Comparisons in Two Conflict Arenas" in Charles F. Hermann, ed., International Crises (forthcoming, 1970); Charles A. McClelland et al. The Communist Chinese Performance in Crisis and Non-Crisis: Quantitative Studies of the Taiwan Straits Confrontation, 1950-1964. (China Lake, California: Behavioral Sciences Group, Naval Ordnance Test Station, 1965); and Gary D. Hoggard, "An Interaction Analysis of the 1962 Sino-Indian Border Conflict," Unpublished M.A. Thesis, University of Southern California, August 1970.
4. Gary D. Hoggard, "Indicators of International Interaction," A paper presented at the 65th Annual Meeting of the American Political Science Association, New York, September 1969.
5. See McClelland, 1968, 1970.