

①

AD-A048132

SIMULATED FOREIGN POLICY EXCHANGES

The Rationale Underlying a Theory of Foreign Policy Interaction

Warren R. Phillips  
Patrick T. Callahan  
and  
Robert C. Crain

Prepared in Connection with the  
Advanced Research Projects Agency  
ARPA Order No. 2345-3D20  
and Monitored by  
The Office of Naval Research  
Contract No. DAHC15 73 C 0197  
January 1, 1973 to December 31, 1975  
\$292,497

DDC  
RECEIVED  
JAN 9 1978  
RESERVED  
D

Research Report No. 12  
Project For Theoretical Politics  
August, 1973

ACCESSION for	
NTIS	White Section <input checked="" type="checkbox"/>
DDC	Buff Section <input type="checkbox"/>
UNANNOUNCED	<input type="checkbox"/>
JUSTIFICATION	
Per Basic Doc	
BY Semi-Annual # 2 on Contract	
DISTRIBUTION/AVAILABILITY CODES	
GEN.	AVAIL. INFO. SPECIAL
A	

**DISTRIBUTION STATEMENT A**  
Approved for public release;  
Distribution Unlimited

This article will present the underlying rationale for a theory of foreign policy dynamics, and is the first in a two part series which will attempt to specify a theoretical perspective for explaining foreign policy exchanges between nations. The goal of the first paper is to discuss the substantive thrust of the research, and to give an overview of the Monte Carlo computer simulation which lies at its core. The second paper will then present a formal mathematical theory which seeks to explain the foreign policy exchanges between nations.

Gradually over the last several hundred years it has become clear that the barrier to understanding foreign policy dynamics has not been the absence of important general concepts; rather it has been the difficulty in identifying and expressing that body of universal principles which explains the actions and reactions of nations in the international system. Most analysts agree upon the basic questions to be asked: Who are the relevant actors? What are their objectives? To what stimuli do they respond? How and why do things change? Halperin and Kanter point out that the differences between analysts over answers to these questions stem fundamentally from different perspectives. "The 'experts' cannot agree on what constitutes the most fruitful level of analysis or where best to look for answers" (Halperin and Kanter, 1973:1).

While not all foreign policy analysts have moved to an events data approach, many have chosen this source of information as a point of departure. In a review of the theoretical underpinnings of the events data movement (Phillips, 1973a), it was found that researchers in this movement have generated an almost overwhelming set of facts and

simple correlational findings. It is indeed unfortunate, however, that while overwhelmed by these fragments of knowledge we still have not discovered a way to structure this knowledge into a whole.

To learn structure is, in short, to learn how things are related. Jerome Brunner says: "Grasping the structure of the subject is understanding it in a way that permits many other things to be related to it meaningfully" (1960). An important question which must be answered at the beginning of any research endeavor is where the researcher should turn to identify the structure of the subject he is studying. It is our position that we must go to the mental images which each of us, as a student of foreign policy, has developed over a period of study. There is nothing new in returning to the mental structures we each hold in our heads in an attempt to explain foreign policy; J.W. Forrester has made this point repeatedly.

Every person in his private life and in his community life uses models for decision making. The mental image of the world around one, carried in each individual's head, is a model. One does not have a family, a business, a city, a government, or a country in his head. He has only selected concepts and relationships which he uses to represent the real system. A mental image is a model. All of our decisions are taken on the basis of models. All of our laws are passed on the basis of models. All executive actions are taken on the basis of

models. The question is not whether to use or ignore models. The question is only a choice between alternative models (Forrester, 1971:54).

We seek to build on a body of research which has developed, over time, mostly out of the works employing events data. But rather than build an explanation of foreign policy dynamics piece-by-piece after each new analysis, we wish to attempt to assimilate that set of findings we currently believe to be essential and plausible into a single integrated theory.

The prevalent strategy in the events movement has been the delineation of a set of patterns for foreign policy actions (Rummel, 1965; McClelland and Hoggard, 1968) and the subsequent search for other variables which correlate highly with these patterns. The principal characterization of this movement has been the collection of data with a view to identifying the dispositional characteristics of nations as they interact in both normal times and crisis periods. Unfortunately, Brunner (1970) has demonstrated very convincingly that data analysis strategies presently employed by political scientists (such as correlation and regression analysis) will usually not reveal the underlying structure of the theoretical system. This will be the case regardless of whether the systems are analyzed cross-nationally at a point in time or individually in a time series. Thus, there is a very serious data analysis problem to be faced in events interaction theorizing. To what extent can data--even time series data--be used to identify the basic structure of a theory of international interactions? Since most analysts' strategies cannot be used to distinguish between the structure of a theory and the para-

meters of that theory, it is the responsibility of the analyst to impose the basic structure on his observations prior to statistical manipulation.<sup>2</sup> Cain and Watts point out that, without a theoretical framework to provide order and rationale for large numbers of variables, we have no way of interpreting the statistical results: "Regression and correlation analysis is properly used to estimate parameters for a model only when the structure of that model and the elements which make up that theory are already well specified. The specification of the structure must precede the application of statistical techniques" (1970: 229).

We have chosen to specify the structure for a theory of foreign policy dynamics based upon the cumulative analysis that we and others have done and upon what we consider to be substantively plausible assumptions. It should be noted that there are others among us who prefer other strategies. Indeed, many would disdain any "premature" attempt at formalization. We are sympathetic to these arguments and do not advocate that our approach be accepted to the exclusion of other approaches. In addition, it should be pointed out that arguments about how to proceed deal with the context of discovery and as such are not open to support from the philosophy of science. Only the context of justification is dealt with in the philosophy of science.<sup>3</sup>

#### MAJOR ASSUMPTIONS

Underlying our approach is the intent to specify how national decision-makers tend to select types of action and reaction from a repertoire of foreign policy outputs to meet different kinds of routine

and non-routine international situations In order to build our theory we have found it necessary to make the following assumptions:

1. The making of a foreign policy can be conceptualized as a series of decisions made by national officials. Foreign policy activity consists of the discrete behaviors representing the outcomes of these decisions.
2. Foreign policy can be operationalized as the aggregation of the foreign policy activity (behaviors) according to some logic imposed upon them by the actor and/or observer.
3. The behavior of one actor towards another is responsive to the actions of other nations and involves efforts to influence who the leaders of these nations will be, what decisions they will make, and how they will define the relations between their nations and others.
4. Foreign policy is made in a multi-nation environment by decision-makers who have to cope with domestic constraints and who have mixed desires (or goals). Their activity is essentially a process of adaptation to the external and internal environments (which they seek to coordinate in an effort to maintain autonomy and national sovereignty while pursuing positive goals in the international system).

The question now becomes one of where to turn to find suggestions for making more formal explanations of the analogs used by nations to

match outputs to inputs. We need a scheme for tying together the rich substantive conclusions from the events literature.<sup>4</sup>

A general scheme suitable for our purposes has been fashioned from work in information theory and in cybernetics, and has been used, with variations, by a number of international relations scholars (Deutsch, 1953; McClelland, 1967; Phillips, 1973c). Two ideas central to this approach are of primary interest here. The first is that each action of a nation can be considered as a potential piece of information that may communicate the intentions, desires, or dislikes of the actor nation to other nations. Information theory may thus be brought into the analysis of the international interaction process. The second idea involves the treatment of social entities (such as nation-states) as purposive systems, and the application of knowledge from the fields of cybernetics and control theory.

Purposive systems are characterized by the pursuit of a goal, and by a process of steering (toward the goal) based upon information concerning any discrepancy between the system's current position and its desired goal (feedback). Thus the system alters its behavior, on the basis of information about its past performance, in order to better achieve some desired goal or end state (Deutsch, 1968; Wiener, 1950).

It is crucial to understand that steering must be with reference to both a purpose or a goal and an evaluation of previous successes and failures through the mechanism of feedback, for such an understanding leads to a number of important points. First, the goal situation sought is outside the system and deals with the purposes of the state in exchanges with other nation-states. Second, the system itself is not

isolated from its environment but depends for its functioning upon a constant stream of information from the environment (as well as upon a constant stream of information concerning its own performance). Finally, a nation's goals may be changing over time. Burton (1969:10) argues that states as political systems operate within an environment of other states to which they are adapting and responding. National interests are not restricted to fixed goals; they include successful adaptations of these goals (a process).

It is also important to realize that the notions of adaptation and steering themselves imply that actions must be based in part on the expectations (of future response) gained from past experience in dealing with an environment which most certainly can be differentiated into objects and behavior. Holsti, North, and Brody share this view:

Essentially, then, it is by projecting past experience into the future that human beings make decisions; and statesmen, in this respect, are not exceptions. Foreign policy decisions, like other human decisions, imply not only an abstraction from history, but also the making of "predictions"--the assessment of probable outcomes. These two operations may be undertaken almost unconsciously, but they are nonetheless real and inescapable. The Marshall Plan was based upon a prediction, derived from some combination of experience, that systematic aid to European nations would bring about certain consequences. Viewed in retrospect, this prediction



seems to have been generally sound. The basic prediction inherent in Khrushchev's decision to establish long-range missiles in Cuba, on the other hand, was much less accurate (1968: 125).

However, before the reader can see the theoretical fruit which the scheme just discussed will bear, we must ask him to bear with us while we examine a substantive area which is strongly related to the later theoretical development. The area to be examined deals with a concept generally called "reciprocity," and it is important for two reasons. First, a good deal of work has been done involving the reciprocity concept, and the work has been generally well received. Second, we feel that our model takes an important first step toward explaining why various patterns of international behavior have been reported in that literature, and why different patterns may occur at various times and under varying circumstances. In a very real sense, then, we hope both to offer additional support for reciprocity and to go beyond it in terms of theoretical development.

#### RECIPROCITY

A good deal of work has already been completed on specifying relatively simple automatic reaction models. This idea was first suggested by Dean Pruitt (1969:392-3) with the introduction of the concept of reciprocity.<sup>5</sup> "Change in one party's level of output on a given dimension often produced reciprocity (also called reciprocal change), i.e., a resulting change in the other party's level of output

on the same or another dimension. [Emphasis ours: note that in order to be considered reciprocal, in this usage, behavior need not be of the same type or magnitude as that received.]

There are a number of reasons why we expect that reciprocity would be a powerful concept for explaining the interactions between nations. One is that there is a very general tendency for humans to respond in a manner similar to the behavior they are confronted with. Some of this tendency would be expected to apply to the behavior of foreign policy decision-makers. In addition to this, though, there are rational reasons for foreign policy makers to initiate behavior which reciprocates the behavior received. If the behavior being responded to is a cooperative action, then a cooperative response would be appropriate because it would reward the sender of the cooperative action (and thus increase the probability of future cooperative behavior). Also, failure to respond with a cooperative act when it was expected may cause the beginning of a series of conflict behaviors.

If the behavior to be responded to is conflictual, it may very well be a challenge to some concrete national foreign policy objective. If this is so, the foreign policy makers can be expected to respond with conflictual behavior in an effort to influence the other party to stop in its challenge to the national goal. It has been argued that nations ought to respond to a challenge to their national objectives with conflictual responses if they want to protect these objectives (Schelling, 1960).

It should be noted that in a significant sense any violent conflict behavior constitutes a challenge to national objectives. One fairly general national objective is to minimize the amount of

violence received from other nations in the system. Thus, any violence directed at a nation ought to be responded to with behavior which would deter such action in the future.

The concept of reciprocity has a long history in writings on international relations. Recently several theorists have emphasized the importance of considering the interactive aspects of behavior exchanged between nations; this is especially important when the nations are antagonists. For instance, Burton (1968) asserts that the progression towards war depends upon equal contributions from both sides, each being governed by perceptions of threat. North and his colleagues assert that war may occur in any number of ways, but the chances of its occurrence are increased by the hostility in the atmosphere of crisis generated by the joint exchanges of the parties involved (1968). Zinnes has been concerned both with the expression of hostility and with its perception as expressed in the ensuing responses to that hostility (1968). These authors all discuss a process of exchange that underscores the similar importance of both participants and actions.

Moreover, the concept of reciprocity has been shown to have some empirical import. Statements developed from the reciprocity perspective along the lines of "behavior begets behavior" have been tested by the principal author and others and found to have a great deal of predictive power (Phillips, 1971; Phillips and Crafn, 1972; Tanter, 1972; Bartos, 1966; Azar, 1970; Smoker, 1969; Leng, 1972).

The problem is how to couch the reciprocity concept in a language structure which will enable us to build a simulation on it. Specification of that language is largely provided in the next section.

## LEARNING

In order to build a simulation which will produce patterns of international behavior marked by reciprocity between nations, we have found it useful to turn to mathematical learning theory. The use of learning was clearly presaged earlier when we indicated that discussions are made partly by projecting past experience into the future. Decision-makers internalize certain lessons through experience; such internalization is learning. Thus there is a very natural bond between reciprocity and learning which we wish to exploit.

The modern perspective in mathematical learning theory began about 1950, and was initiated by the stochastic learning theory of Robert Bush and Frederick Mosteller (1951, 1955). The process considered by Bush and Mosteller involved a sequence of discrete events. Each event consisted of the presentation of a stimulus to which the subject responded (by selecting one from a set of alternative responses in accordance with an associated set of probabilities). The response was followed by an outcome which might induce changes in the probability values before the next trial. Thus, the learning process was analytically divided into a sequence of stimulus, response, outcome, and resultant probability adjustment. All models in mathematical learning theory are concerned with describing this flow of (or change in) probability from trial to trial and the resulting sequence of distributions.

One of the most applicable developments of the Bush and Mosteller model has been suggested by Rainio (1966). Rainio's basic idea for constructing a stochastic model of exchanges was to consider social interaction as a process derived from the learning of individuals participating

in it. The fundamental assumption underlying his model is that a sequence of behavior is a series of choices among various alternatives. Certain probabilities are associated with the choice of the behavior alternatives in accordance with the mathematical laws developed by Bush and Mosteller.

The core of the system is an adaptation process, a theory of social interaction that adjusts the probabilities of interactions and behavior based upon an assessment of past interaction. If an exchange of acts is assessed as rewarding then the probability of this action being repeated is increased. In like manner, one punishing exchange will decrease the probability of recurrence. One purpose of this model is to find, in each particular instance, the probabilities that a particular actor will choose a particular behavior and direct it toward a particular target.

The reader will recall that in the earlier discussion of the purposive characteristic of social systems it was argued that it is necessary to have goals before behavior can be modified to reach them. We believe that there are two goals which nations can pursue which will produce patterns of behavior marked by high reciprocity.

The first such goal was the one employed by Rainio in his development. It is that social entities seek consistent relations. When a relationship is consistent then it is rewarding to a nation which has consistency as its goal. For example, if two nations were to engage in mutually conflictual behaviors, then the exchanges would be consistent and hence rewarding. That this goal will generate a

pattern of behavior marked by reciprocity is clear and need not be commented on further.

The second such goal is probably more prevalent in international politics. That goal is that nations seek to minimize the amount of conflict and maximize the amount of cooperation directed at them by other nations. Thus when an interaction stimulates a cooperative response from the partner it is rewarding and when it stimulates a conflictual response it is punishing.

Earlier, in discussing the strategic reasons for nations to behave reciprocally, the argument was advanced that in effect reciprocal behavior would be an outcome of a national foreign policy which sought a) to minimize conflict received by punishing those who send conflict and by rewarding those who send cooperation, and b) to maximize cooperation received by rewarding it when it occurs. Thus the second goal will generate reciprocal patterns of behavior.

In order to realize either of these two goals, nations can employ two different strategies. One strategy would be to interact more with those partners who are in the desired posture towards oneself. Thus, if one wants only consistent relations, then one will increase behavior initiated towards nations which respond consistently to one's behavior. If, for example, one wants cooperative relations, then one would increase behavior directed towards nations which are predominantly cooperative with the actor.

The second strategy involves attempting to get those nations who are not responding in the desired fashion to change their behavior. In other words, one tries to persuade them to change by increasing the

amount of behavior aimed at them.

The predictions generated by the two goals and two strategies for different patterns of interaction in a dyad are laid out in Table 1. As can be easily seen, the predictions for the second strategy are completely different from those for the first strategy for all cases.

All of this substantive discussion allows us to stipulate the first fourteen of the simulation rules which constitute the essence of our theory.

- Rule 1. International interaction takes place between two nations in a given finite set of nations.
- Rule 2. Interactions are capable of a strong chronological order.
- Rule 3. There is a probability vector, independent of time, whose components specify the probability that a specific number of acts occurs in the system during one time period (month).
- Rule 4. There is a probability vector, independent of time, whose elements give the probability that each nation is the actor. The probabilities in the vector sum to unity.
- Rule 5. For each nation there is a probability vector (not necessarily independent of time) whose elements give the probability that a nation, as actor, contacts each of the other nations. There is one such vector for each nation and the probabilities in each vector sum to unity.

- Rule 6. Once the actor and object are specified the contact is always realized.
- Rule 7. A nation must desire one of two possible modes of interaction (goals). It may seek consistent relationships with its dyadic partners or it may seek cooperative relationships with its dyadic partners.
- Rule 8. A nation must choose one of two strategies in seeking its goals. It may choose to increase the probability of interacting with those partners with whom interaction is the desired mode (reinforcement) or it may choose to increase the probability of interacting with those partners with whom interaction is not in the desired mode (conversion).
- Rule 9. When contact is realized between two nations the object perceives the behavior as rewarding or punishing. The behavior is rewarding if it places the interaction in the desired mode. The behavior is punishing if it places the interaction out of the desired mode.
- Rule 10. If  $j$  wishes to increase its probability of choosing  $i$  as object the next time  $j$  is the actor, it does so according to the rule  $P_{N+1} = P_N + \alpha_0 (1 - P_N)$ . The probabilities of  $j$  choosing other nations as objects will then be decreased so that the result is still a probability vector whose elements sum to unity.



- Rule 11. If  $j$  wishes to decrease its probability of choosing  $i$  as object the next time  $j$  is the actor, it does so according to the rule  $P_{N+1} = P_N - \beta_0 P_N$ . The probabilities of  $j$  choosing other nations as object will then be decreased so that the result is still a probability vector whose elements sum to unity.
- Rule 12. For each dyad, and for each specific type of behavior which  $i$  may send to  $j$ , there is a probability vector (not independent of time) each element of which specifies the probability that  $j$  will respond to  $i$  with a particular type of behavior the next time  $j$  is the actor and  $i$  the object.
- Rule 13. If the action sent by  $i$  to  $j$  is rewarding to  $j$ , then  $j$  will increase the probability of acting in the same way as its most recent action toward  $i$ . This increase in probability follows the rule  $P_{N+1} = P_N + \alpha_a (1 - P_N)$ . The probabilities of choosing the other acts in the vector will be decreased so that the elements of the vector sum to 1.0.
- Rule 14. If the action of  $i$  toward  $j$  is punishing to  $j$ , then  $j$  will decrease the probability of acting in the same way as its most recent action toward

i according to the rule  $P_{N+1} = P_N - \beta_{\alpha} P_N$ .

The probabilities of choosing the other acts in the vector will be decreased so that the elements of the vector sum to 1.0.

The basic goal of the simulation model described is to increase our understanding of foreign policy decisions by linking together some of the principal factors involved. In attempting to develop a greater degree of knowledge about the interaction of nations in the international system, we consciously strive towards an explanation of the mechanisms which produce interactions. We would expect that the interaction between nations is influenced by a wide variety of considerations. Mathematical learning theories of Bush and Mosteller were adapted by Rainio and have been carried here into international relations as a mechanism for matching inputs to outputs. They provide a pleasure-pain learning algorithm. However, international relations is generally considered to be much more complex than this view of reality would suggest. We intend to add complexity to this basic model in an attempt to integrate into the model a number of other concerns found in the foreign policy literature.

#### UNCERTAINTY

Earlier, we posited that the behavior of one nation toward another nation is in large part dependent upon the behavior of that nation to it. The idea of a chronological order is also important and closely related to the concept of interaction. If a nation's behavior

or choice of object is in any part determined by behavior it has received, it is logical to expect that the order in which actions are received and sent will be an important consideration. Similarly important is the question of volume (or variety) of interactions. It would seem that the more interactions of a specific nature are received the more established is the pattern of interaction between two nations. There is, in other words, very little uncertainty, but a change in the nature of the interactions would add uncertainty.

The amount of information being conveyed between nations in any period of time must depend upon both the number of signals transmitted from nation to nation and the variety of those signals. Techniques have been developed to measure and account for both the variety of signals transmitted and the amount of information transmitted. The heterogeneity of these signals--that is, the variety of basic patterns--at any point in time is a measure of the uncertainty which would attend any attempts to specify the sender's selection process (Cherry, 1957; Shannon and Weaver, 1949; Ashby, 1952).

Information theory provides an excellent measure of the uncertainty  $H$ , present in a set of signals:

$$H = \sum_{i=1}^N - P_i \log_2 P_i ,$$

where  $P_i$  is the independent probability of occurrence of signal type  $i$  and where there are  $N$  types of signals. Thus, from the probabilities  $P_i$  of different types of signals occurring in a given time period (in this case, that defined by the last 8 acts received by the object), the uncertainty associated with the score for that period can be ascertained. If all outputs are equally likely, uncer-

tainty is at a maximum. It is common to divide the actual uncertainty by the maximum potential value, deriving as a result the percentage of (maximum) uncertainty ( $H_{rel}$ ), which is more easily comparable across sources with differing sets of possible signals.

Let us consider two examples. First, there is the case in which a given nation chooses to send to a particular object 8 acts in a given time period. The distribution of these acts is presented in Table 2; notice that the actor has chosen to send an equal number of each type of signal to the object. By way of contrast, Table 3 shows an unequal distribution of actions across the same eight categories. Observe that the relative uncertainty figure for the distribution in Table 2 is higher than that for the distribution in Table 3. Thus, the implications of uncertainty are that in the equal-probability instance, there is no way to judge if further occurrences would be more likely to fall in one category instead of another. In the case of Table 3, we might expect that the object nation would be more likely to receive act types D and E than the other acts. Thus an observer's uncertainty as to the likely activity of the nation represented in Table 3 is reduced. The smaller the  $H_{rel}$  figure, the more certain it is that a nation will choose a particular activity. McClelland has interpreted this relative uncertainty by suggesting: "A common sense way to view a series of  $H_{rel}$  numbers us to think in terms of a 'fanning out' toward equality of distribution across the category system with the larger figures and a 'channeling in' of the distribution towards relatively frequent occurrences in fewer categories with the smaller figures. As the ratio approaches 1.00 it suggests not only that everything that

could happen has been occurring but also that the behaviors have shown increasing signs of disorderliness. The information measures do not tell us what the particular lack of ordering is but they do give us a technical indication of a large amount of variety in the emissions. As the ratio decreases towards .000, the suggestion is that (1) there may be present a large amount of highly patterned and repetitive behavior and a limited variety in the actions or (2) very little is occurring" (1973:91).

A long series of analyses by Charles McClelland and his associates (1965, 1968, 1973) have been carried out with the variety measure introduced above to establish how it functions in crisis and non-crisis periods. They have demonstrated that the mix of behavior does indeed change toward greater variety in a crisis. The basic results are these: (1) With occasional exceptions, an  $H_{rel}$  of .700 or higher is associated with crisis periods and only with crisis months. (2) If we operationalize the beginning and duration of international crises with an  $H_{rel}$  criterion of .700 or higher, we are able to state when a particular crisis began and how long it lasted. (3) All non-crisis periods, with rare exceptions, have monthly  $H_{rel}$  figures below .700 (McClelland, 1973: 92-93). The literature on communications in international relations argues that in periods of crisis overload occurs, and actors display an inability to respond consistently to foreign policy inputs (Holsti, 1965; Burton, 1968). This would suggest that for dyads in periods of high relative uncertainty (usually crises) nations are less able to respond consistently to their object nation's activities. But it seems to be

the case that in periods less uncertain than crises, nations are capable of responding more reciprocally when they know more fully their opposite's intentions. This point needs further elaboration.

Burton has suggested that if one of the "tricks" in negotiation is for actors to send frequent responses if they wish to communicate changes in their perception of the situation. He also suggests that the process of conflict resolution is in part a process of testing whether information is received as it was transmitted (Burton, 1969: 54-55). One function of ambiguity and noise in message signals sent from one nation to another, as pointed out by Jervis, is "to make it easier for actors to strike and maintain bargains. At first glance the contrary argument seems more plausible--that the easier it is for each side to make its views understood (at least on the semantic level), the more the bargaining process is facilitated-- . . . this position might be correct if the actors could make the other side believe they would act the way they said they would" (1970:127). But since this is normally impossible, noiseless bargaining would make simple initiatives less plausible and thus more likely to be discounted.

When nations are sending multiple types of signals it would appear easier for other nations to respond with what they judge to be appropriate behaviors. This is so because multiple types of signals allow a nation to test whether its intent was correctly received by analyzing the multiple responses. It is also likely to be the case that if one nation wants the other to believe its intent, that nation should signal its intent in multiple ways (by orchestrating its signals).

Nations which are interacting frequently must consider how they can make other nations understand the intent of their communications. If a nation wishes to orchestrate its foreign policy outputs to facilitate understanding:

- 1) It must design and deliver messages in a way that will gain and hold the attention of the intended object.
- 2) The signals must adequately refer to past experience between actor and object.
- 3) The communicator must choose actions which match his verbal statements so that the message is convincing.
- 4) The communicator must be able to notice and interpret any responses either as feedback or as the performance of preferred behavior before he can estimate his degree of satisfaction (as measured against his country's objectives).<sup>6</sup>

Now let us summarize this discussion. When single signals ( $H_{rel} = 0$ ) are sent, they are likely to elicit only moderately standard responses. Slightly more complex messages (with a relative uncertainty value greater than zero but less than 0.5 for any given period) are somewhat more easily responded to in a systematic fashion. On the other hand, those messages which are quite heterogeneous in the number of signals sent (but short of the complexity facing crisis participants) can be responded to clearly and consistently.

This leads to the following assumption:

Provided that the communications channel is not overloaded, the more heterogeneous the signals

sent from one nation to another in a given time period, the more certain are observers in specifying an appropriate response.

Extrapolating from this discussion, let us suggest that when there is a homogeneous signaling from one nation to another (that is, when the redundancy in signals is high) one would expect the recipient nation to identify less clearly the intent of the actor and to act out of its own inertia. For periods of time in which there is a heterogeneity of signals (behaviors), and thus a richer mix of behavior for that time period, objects are more certain about the implications (real and potential) of the actor's behaviors. This allows us to add another rule to the simulation model:

Rule 15. If the relative uncertainty ( $H_{rel}$ ) computed on the last eight acts sent from  $i$  to  $j$  is less than .50, then  $\alpha_0$ ,  $\alpha_a$ ,  $\beta_0$ , and  $\beta_a$  are decreased by  $k_{\alpha 0}$ ,  $k_{\alpha a}$ ,  $k_{\beta 0}$ , and  $k_{\beta a}$  respectively. If  $H_{rel}$  is between .50 and .70, then  $\alpha_0$ ,  $\alpha_a$ ,  $\beta_0$ , and  $\beta_a$  are increased by  $k_{\alpha 0}$ ,  $k_{\alpha a}$ ,  $k_{\beta 0}$ , and  $k_{\beta a}$  respectively. If  $H_{rel}$  is greater than .70, the probability of nation  $j$  choosing nation  $i$  as object is increased in accordance with the rule  $P_{N+1} = P_N + \alpha_0 (1 - P_N)$ , and then  $\alpha_0$ ,  $\alpha_a$ ,  $\beta_0$ , and  $\beta_a$  are decreased by  $k_{\alpha 0}$ ,  $k_{\alpha a}$ ,  $k_{\beta 0}$ , and  $k_{\beta a}$  respectively. [See also Rule 18.]



**DOMESTIC CONSTRAINTS**

Few political scientists would dispute that governments are required to deal, on a continuing basis, with large numbers of problems of many different types. In order to cope with these problems large organizations are established, usually along functional or quasi-functional lines. Such organizations routinize as much of their activity as possible through the development of a set of standing operating procedures (SOP's).

In order to minimize demands on their time, top government decision-makers focus their attention primarily on problems which percolate up to them through these functional organizations, make decisions on those problems with information transmitted through the same organizations, and rely once again upon the organizations to carry out whatever action has been chosen as the appropriate response. In this form of decision-making there is a strong emphasis on two points. First, the organizations involved are considered to be hierarchically structured. Second, only very limited flexibility is available to the agency in performing any of its functions; the SOP's form relatively tight constraints.

Foreign policy outputs are thus always regarded as the result of ponderous procedures developed over time, but instead are sometimes regarded as outcomes of a political process in which individuals (usually the heads of organizations) engage in compromise, coalition formation, competition, and bargaining. Goal-setters resort to such activities in efforts to influence the selection of policies and actions which

are judged favorable to the individuals and to their respective agencies according to personal and organizational criteria. Furthermore, while this bureaucratic politics scheme assumes that the organizations themselves are hierarchically organized, it also assumes that goal-setters have sufficient freedom of maneuver on various issues to enable them to actively pursue a political, bargaining-oriented strategy in inter-agency disputes during policy decisions.

Of course, a distinction is made between actions taken by the bureaucracies (in accordance with SOP's and previous policies) and actions taken as a result of political interaction among goal-setters. While much of the day-to-day interaction among nations is handled by the former level, it is suggested that really important decisions are either kicked up to, or sent up at the request of, the high-level officials.<sup>7</sup>

We wish to focus here essentially upon a combination of these characteristics. It is clear that organizational structures play a large part in foreign policy. In the SOP case they are the primary focus. In what has become known as the bureaucratic politics paradigm they form the context within which individual goal-setters, as well as lower-level bureaucrats, are seen to function. We should remember, however, that organizational structure and SOP's are considered to be only two of a larger and relatively diverse set of influences upon goal-setters.<sup>8</sup>

The general utility of the bureaucratic politics paradigm as a means of explaining foreign policy decisions and actions has been

well demonstrated (Halperin, 1972a; 1972b; Neustadt, 1970; and Halperin and Kanter, 1973, editor's introduction). The paradigm itself has been given additional refinement in efforts by Allison and Halperin (1972), and by Halperin (1971).<sup>9</sup>

A close examination of the bureaucratic politics paradigm shows that one of the paradigm's dominant features is a distinction between those actions taken by lower level bureaucrats (workers) and those actions taken by goal-setters. Outputs generated at the worker level can be treated as resulting from SOP's which have developed slowly and incrementally through time in a learning process. When goal-setters become involved, however, the learning process undergoes significant changes. In general, we might expect that the process of adaptation takes place much more quickly when senior level decision-makers determine foreign policy outputs, since they are much less tightly bound by SOP's in general, and by organizational constraints on specific issues. It also seems reasonable to expect that during high-threat situations (such as crises and military conflict situations) goal-setters are considerably more likely to involve themselves in the foreign-policy process. Finally, various domestic (political) considerations would probably influence goal-setters' decisions on whether or not to intervene in specific policy decisions; thus the role of domestic events will be considered in more detail shortly.

With respect to bureaucratic politics, then, it seems most important as a first cut to distinguish simply whether or not foreign policy outputs are the result of goal-setter involvement in the decision process. If only workers are involved, reactions to various types of situations will be quite stable, and will change only slowly and

incrementally. When goal-setters determine outputs, however, relatively major shifts from SOP's are possible and thus learning can be quite rapid. The greatest problem remaining is thus to specify when goal-setters are likely to involve themselves. We have suggested in the section on uncertainty that such involvement should take place during periods of crisis, and during periods of military conflict.

These thoughts are reflected in the following simulation rules:

- Rule 16. There is a probability vector, not independent of time, each element of which specifies the probability that a particular level of foreign policy decision-maker chooses a nation's action. There are two levels of foreign policy decision-makers: goal-setter and working operator.

Rule 17. If goal setters are involved in the choice of an action, then  $\alpha_a$ ,  $\alpha_o$ ,  $\beta_a$ , and  $\beta_o$  all increase by  $\lambda_{\alpha a}$ ,  $\lambda_{\alpha o}$ ,  $\lambda_{\beta a}$ , and  $\lambda_{\beta o}$  respectively.

Rule 18. If  $H_{rel}$  is greater than .70 for behavior sent from  $i$  to  $j$ , the probability of  $j$ 's goal setters being involved in choosing  $j$ 's next action to  $i$  will be increased in accordance with the rule

$$P_{N+1} = P_N + \alpha_b (1 - P_N).$$

Previous work by the principal author (Phillips, 1973b) has suggested that the influence of domestic events may be greatest in determining the degree of a nation's over- or under-response from a relatively stable pattern. A consideration of domestic events in

this manner fits nicely with the analytic approach of treating domestic activity as an important determinant of whether or not goal setters become involved in the foreign policy process. It was suggested earlier that it is the involvement of such senior-level officials that is responsible for significant shifts away from reasonably stable norms of foreign policy behavior. Within this section, then, we shall also be concerned with suggesting what broad categories of domestic activity might be important to goal-setters, and with suggesting further what the effects of each category might be with respect to the foreign policy process.

Very broadly, we can classify domestic activity into three types: renewals of power, transfers of power, and indications of domestic uncertainty. The first type, renewals of power, refers to reelections of regimes already in power. Such reelections could be either victories at the polls (in western-style democracies, especially), or expressions of support of an equivalent nature (the election of new members to the Politburo who are known supporters of the current regime, for instance). As expressions of support, events of the power-renewal type should encourage a regime to continue most of its current policies, and (for a time at least) to have less fear of the potential consequences arising from discontinuing unsuccessful policies. It does not seem likely, however, that renewals of power, of and by themselves, would significantly alter the propensity of goal-setters to be active in the foreign policy process.

Power transfers would include dismissal and replacement of the current regime, and would usually reflect a lack of support for that regime's policies. In general, we might reasonably expect members of the new regime to participate actively in the determination of foreign policy, in order to bring it more nearly in line with their own goals. Thus the opportunity should exist for rapid learning and for major shifts from previous positions.<sup>10</sup>

The third category, indications of domestic uncertainty, can be subdivided according to whether the expression of uncertainty concerns foreign or domestic affairs. A regime faced with uncertainty as to whether its foreign policy activities will engender popular support or popular animosity will likely choose to participate actively in the selection of foreign policy outputs, and will also be quite sensitive to whether its chosen outputs are rewarding or punishing in terms of the regime's goals.<sup>11</sup> If the regime is faced, on the other hand, with the potential loss or gain of a significant amount of support as the result of its domestic policies, it is probable that the regime will concentrate on those domestic policies and on the domestic policy process. Such concentration will result in a lack of attention, on the part of senior officials, to problems of foreign policy. In addition, the demands of domestic uncertainty may cause goal-setters to direct the staffs of agencies whose responsibilities bridge both domestic and foreign affairs to concentrate on the domestic area.<sup>12</sup> This results in a diminished overall capacity for learning (and even incremental adjustment) within the foreign policy process; previously established SOP's and other norms are likely to dominate foreign interaction under such circumstances.

The impact of domestic events upon the dynamics of foreign policy has been specified in the simulation through inclusion of the following epic rule:

Rule 19. Domestic events can be classified into three types:

1. Renewal of power
2. Power Transfer
3. Domestic Uncertainty
  - a) over foreign affairs
  - b) over domestic affairs

If a domestic event of type 1 occurs,  $\beta_0$  and  $\beta_a$  are increased by  $m_{\beta 0}$  and  $m_{\beta a}$  respectively.

If a domestic event of either type 2 or type 3a occurs,  $\alpha_0$ ,  $\alpha_a$ ,  $\beta_0$  and  $\beta_a$  are increased by  $m_{\alpha 0}$ ,  $m_{\alpha a}$ ,  $m_{\beta 0}$ , and  $m_{\beta a}$  respectively.

If a domestic event of type 2 occurs, the probability of goal setters making the decision is increased using the rule  $P_{N+1} = P_N + \alpha_b (1 - P_N)$ .

If a domestic event of type 3a occurs, the probability of goal setters making the decision is increased in accordance with the rule  $P_{N+1} = P_N + \alpha_b (1 - P_N)$ .

If a domestic event of type 3b occurs, the probability of goal setters making the decision is decreased in accordance with the rule

$$P_{N+1} = P_N - \beta_b P_N.$$

## THE IMPACT OF THIRD PARTIES

All of the substantive discussion to this point has been in terms of two-nation interaction. This would be fine if the world were composed of two nations, but it is not. Therefore we need to look at the systemic impacts upon the actor and object nations. We have chosen to approach this problem by examining the impact of third parties upon the reciprocity between nations in the dyad.

We contend that third parties can have an impact on dyadic relations in three possible ways. The first is predicated upon the assumption that the actions of a nation's dyadic partner toward a third party can be perceived as relevant to the achievement of the nation's goals with reference to the third party. For example, if we define a dyad composed of the nations *i* and *j* (see figure 1) with *i* as the actor, and *j* initiates some behavior toward a third party *h*, *i* may modify its behavior toward *j* to influence *j* to either stop its behavior toward *h*, or to influence *j* to continue or increase its behavior toward *h* if that behavior is conducive to the achievement of *i*'s goals with respect to *h*.

This is not a new position in the literature on foreign policy. Harary(1961) has explored the relations among three nations (a triad) from the perspective of balance theory. The fundamental rule of behavior for this approach, he argued, was that "a friend of my friend is my friend, a friend of my enemy is my enemy, an enemy of my enemy is my friend, and an enemy of my friend is my enemy." By applying this rule, nations modify their behavior so that a situation is brought about in which only one pair or all three pairs of dyads in a triad are friendly.



Illustrative examples of the impact of third parties abound. The behavior of President Nixon toward the Soviet Union and the People's Republic of China, it can be suggested, was influenced to a great deal by his desire to get them to cut off or cut back their aid to North Vietnam. In December of 1972, Sweden's actions toward the United States changed drastically due to American actions toward North Vietnam. Periodically, the United States places its West European allies under tremendous pressure to increase their allocations for economic and technical assistance to the poorer nations of the world. And in the winter and spring of 1973, Israel launched a number of military raids against Lebanon in order to coerce that nation into placing restrictions on the activities of Palestinian guerrillas.

Two problems, though, exist in the previous writings on the impact of third parties. One is that the theoretical focus is too narrow. The example of U.S. actions toward Western Europe concerning foreign aid indicates a weakness in the Harary formulations since he does not provide a handle for dealing with the case of under-cooperation, as opposed to outright conflict.

The second difficulty is that they provide only bivariate hypotheses. They indicate the potential relevance of a new class of variables, third parties, but fail to indicate how they should be used in conjunction with the traditional dyadic focus. Without further theoretical development a researcher would be forced to look only at one approach or the other, not both at the same time. The problem is that it is possible for the needs of dyadic interactions and triadic interactions to contradict (for a formal proof of this position see

Phillips and Callahan, 1973:20-21). Thus we need a set of rules which will inform us when to expect the dictates of dyadic interactions to dominate the dictates of triadic interactions, and vice versa.

The search for such rules has so far led us to posit the following four potential rules. All seek to identify conditions under which the goals relating to a third party will seem to the actor nation to be more important than the goals relating to the object nation.

The first rule is based in the body of theory which is usually referred to as social field theory or social distance theory (Lewin, 1951; Wright, 1955; Rummel, 1965, 1971). The essence of this perspective is that social units can be represented as an agglomeration of attributes. These attributes can be employed to define a multidimensional field. Individual units can be located in this field, and distances between individual units can be measured. The smaller the distance the more alike are the units. The fundamental theorem of social field theory or social distance theory is that the distances (or dissimilarities and similarities) between social units have an impact on the behavior of the units toward each other. Quincy Wright's homely expression of this idea was to portray nations as maggots in a cheese:

They vaguely perceive each other as they approach, often changing directions in response to primitive instincts and urges, to sophisticated patterns and policies, and to deliberate appraisals of purposes and powers (1955:546).

Whereas previous work in social field/social distance theory has been focused on the dyadic level, we believe that it would be useful to

apply it to the interactions in triads. The position we propose is that the smaller the social distance between the third party and the actor, the more significant the interactions involving the third party in determining the behavior of the actor. The rule would then be that actors will sacrifice dyadic reciprocity if the third party is closer in terms of social distance, to the actor.

The second rule is based on the supposed importance of a nation's ideology in determining its foreign policy behavior. The assumption is that there is a class of nations for whom various third parties have some specific ideological import. In some cases the set of nations can be fairly large. For example, the United States defines for itself the ideological position of protector of the "free world," the Soviet Union sees itself as the defender of the Socialist sphere, and the People's Republic of China sets itself up as the leader of the underdeveloped world. The assumption we adopt is that if the actor has some particular ideological interest in the affairs of the third party, then it will be responsive to the interactions involving that third party. The rule would thus be that a nation will sacrifice dyadic reciprocity if it has sufficient ideological interest in the third party.

The third rule derives loosely from balance of power theory. That theory suggests that nations will form alliances in such a manner that no single nation or group of nations will achieve preponderance in the international system. In the pursuit of the balance of power nations will attend to no other factors in a situation other than the need to balance power. A nation which wishes to balance power must direct hostility toward the dominant nation and support toward the

nations which are in danger of being controlled. This suggests the rule that nations will sacrifice dyadic reciprocity when it (dyadic reciprocity) would require failure to balance power in the international system.

The fourth rule is based on the supposition that nations will respond to interactions involving third parties only when the behaviors involved are at a high level of intensity. To alter Harary's formulation, an enemy of my friend is my enemy only if he is directing extreme conflict towards my friend. Otherwise, there is no clear and present danger presented by the conflict situation: the status quo could continue for some time without presenting a threat to the well-being of the friend. In such cases, actors may not modify dyadic reciprocity in order to alter the triadic configuration, choosing rather to hope that the situation would be cured on its own.

A second approach to the impact of third parties is closely tied to our communications perspective. This involves the potential impact of communication overload in a triad. If the actions of nation *i* to nation *j* and back again are heavy enough, the attention of the decision-makers in nation *i* or nation *j* would be so focused on that interaction that the actions of nation *h* to either nation would not be perceived accurately and responded to appropriately.

The third possible way for third parties to have an impact on reciprocity is applicable only to relatively hierarchical political systems where the capacity to apply punitive sanctions is heavily in favor of one of the nations in the system. In such a case, it may be possible that the underdog will modify its behavior so as to communicate to the topdog the similarity of their goals and policies. This

would be in order to avoid the application of punishment that might follow from the perception of the topdog that the underdog was pursuing goals which contradicted the goals of the topdog. Instances where such a process may be hypothesized as having happened are the policies of the nations of the Soviet bloc prior to the Sino-Soviet split (which may have been adjusted to appease the Soviet Union at the expense of reciprocating friendly overtures from Western nations) and the foreign policies of Latin American nations who did not wish to alienate the United States. It should be emphasized that these examples are only hypothetical. No assertion that they are true is made, nor is it claimed that others assert them.

Some aspects of the impact of third parties in dyadic behavior can be incorporated through axioms previously presented. Therefore only one additional rule needs to be advanced to complete the inclusion of the substantive argument above.

Rule 20. Once the actor  $i$  and object  $j$  are chosen, if the last act was:

- a) From  $j$  to another nation  $h$ , the probability that  $i$  chooses the same act that  $j$  directed toward  $h$  is increased according to the rule  $P_{N+1} = P_N + \alpha_t (1 - P_N)$  regardless of  $j$ 's last act toward  $i$ .
- b) From  $h$  to the actor  $i$ , the probability that  $i$ 's behavior to  $j$  will be the same as the

act that h directed to i is diminished

according to the rule  $P_{N+1} = P_N - \beta_t P_N$ .

With the statement of this rule the substance of the theory has been completely presented.

#### SUMMARY

At this juncture all the elements of the theory have been presented and substantive justification has been given for their inclusion. The vehicle (mathematical learning theory) for integrating all these elements has also been presented. However, until all elements of the theory have been given an explicit integration into the theory, we shall have accomplished no more than to reiterate a series of hypotheses. We therefore turn to the job of integrating the parts.

As mentioned previously the theory is in the form of a Monte Carlo computer simulation. A sequence of decisions is made by the computer on the basis of the instructions given it. These decisions determine the values of the key variables of each event: the actor, the object, the action type, and the level of the decision-makers involved in the actor nation.

The operation of the simulation is on an event-by-event basis. One event is produced by the machine and then a series of modifications in parameters and memory are made before the next event is generated. Thus, one can think of the simulation as having a series of cycles, with each cycle dependent in part upon the outcomes of the previous cycles.

Each cycle begins with the choice of an actor. This step was defined substantively in Rule 4 (page 14). Unlike most aspects of the

simulation, the choice of actor in each cycle is not dependent upon results of previous cycles. Rather, the probabilities of each nation being the actor have been calculated from empirical data, and are fixed.

Next, the identity of the object of the action is determined. Like the choice of actor, this step is not especially complicated. Essentially the object is determined from the matrix of probabilities which results from Rule 5, page 14. Initially, the probabilities in this matrix are those derived from analysis of empirical data. In all succeeding cycles these probabilities are modified on the basis of whether the exchanges between each nation and various other nations are rewarding or punishing. The process through which this occurs is part of the learning routine and is described in Rules 10 and 11, pages 15 and 16.

The actor's decision-makers must next choose the type of action to be sent to the object. Before they do this, they check how effective their prior behavior has been in helping them achieve their goals. The check is made by examining the last act they sent to the object and the last act received from the object. A comparison is made between these actions to determine if the exchange was rewarding or punishing. For example, suppose that the goal of the actor is cooperative relationships. It then looks at its action to see if it has elicited a cooperative response. If so, the exchange was rewarding and the decision-makers will want to increase the probability of sending the same action this time. In other words, learning has taken place. In the simulation, this occurs through use of the algorithm in Rule 13 (page 16). If the exchange was

unrewarding, then the decision-makers would want to decrease the probability of initiating the same kind of event. Therefore, the learning algorithm set out in Rule 14 (pages 16 and 17) is employed.

Before the probabilities in the action-type vector are modified through learning, though, some other aspects of the situation may increase or decrease the sensitivity of the decision-makers to learning. In the simulation, this is accomplished through changes in some of the parameters of the learning algorithm. One such aspect is the level of relative uncertainty.

In the simulation, the actor looks back into his memory and examines the last 8 events received from the object nation. The  $H_{rel}$  statistic is calculated on the basis of these 8 events. The impact of  $H_{rel}$  on the learning algorithm is described in Rule 15 (page 23).

Two other areas, bureaucratic politics and domestic events, both have their impact on learning by bringing into the decision-making process the top political decision-makers in the nation, which accelerates learning according to the rule in Rule 17 (page 27).

In the simulation, two variables help to determine if the top political decision-makers are involved. One is a vector of probabilities (estimated from empirical data) that top decision-makers are involved. This vector is itself modified by the level of  $H_{rel}$ , according to the rule in Rule 18, page 27).

After the values of the parameters in the learning algorithms have been determined in this way, the learning calculations are carried out and the probabilities in the action-type matrix are modified according to the rules in Rules 13 and 14 (pages 16 and 17).



Before the action-type is chosen, however, one other variable has an effect; that variable is the impact of third parties. Third party considerations act directly on the matrix of action-type probabilities according to the rule articulated in Rule 20 (pages 36 and 37).

The crucial variables in the event will have thus been decided. One cycle in the simulation is nearly completed. The only thing remaining to be done is to change the probabilities in the object's object-choice vector. This is done by the object evaluating the sequence of events defined by this most recent event and the last previous one in which the present actor and object were reversed. The evaluation process has been described above (p. 38), and is loosely analogous to that performed with respect to action type. On the basis of the evaluation, the vector of objects is modified according to Rules 10 and 11 (pages 15-15). Once this is done, the cycle is completed and control passes to the next cycle.

#### CONCLUSION

A well-known maxim (of Destouches)--often quoted but rarely heeded--says that every paper beginning with axioms should be preceded by another paper justifying the choice of those axioms. In the present case we have tried to adhere to Destouches' admonition; this paper has attempted to provide the reader with a justification for each Rule and to whet the appetite for what is to follow. In a second article we will lay out the formal, axiomatic theory of which the simulation presented here is a model.

## FOOTNOTES

1. This paper was prepared in connection with research supported by the Advanced Research Projects Agency, ARPA Order No. 2345-3D20, Contract No. DAHC15-73-C-0197, RF 3527-A1. This document has been approved for public release and sale; its distribution is unlimited and reproduction in whole or in parts is permitted for any purpose of the United States Government.

The authors wish to thank those students at Ohio State University who have been working along on the development of this computer simulation. Special thanks go to John Thompson, Yong-ok Park, and Dick Stoddard.

2. For the serious implications of attempting analysis before structure has been posited in time series analysis see the excellent critique by Hibbs (1972).

3. The point is continually emphasized in Popper (1959), "The initial stage, the act of conceiving or inventing a theory, seems to me neither to call for logical analysis nor to be susceptible of it. The question, how it happens that a new idea occurs to a man--whether it is a musical theme, or a dramatic conflict, or scientific theory--may be of great interest to empirical psychology; but it is irrelevant to the logical analysis of scientific knowledge. This latter is concerned not with *questions of fact* (Kants *quid facti?*), but only with questions of *justification or validity* (Kants *quid juris?*), its questions are of the following kind. Can a statement be justified? And if so, how? Is it testable? Is it logically dependent on certain other statements? Or does it perhaps

contradict them? In order that a statement may be logically examined in this way, it must have already been presented to us. Someone must have formulated it, and submitted it to logical examination." (Popper, 1959:31)

4. Such a scheme can be likened to the criteria that a map maker brings to the drawing of a particular map. The criteria for deciding whether or not to include roads, or altitude plus or minus sea level, depends on the cartographer's perception of what the map is to be used for. Toulmin likens the drawing of a map to the laying out of a theory (1953). In this article we attempt to lay out our goals or criteria which we will use in specifying a theory of foreign policy interactions.

5. Research in psychology tends to support the notion of reciprocity. Taylor (1965) and Tognoli (1967) provide evidence suggesting that increases in the intimacy of a subject are due to the increasing intimacy of his companion's remarks. Changes in the rate of smiling also tend to be reciprocated in the same time (Kendon, 1967). Explanation for the norm of reciprocity may be found in Gouldner (1960) and Pruitt (1965, 1968). Homans (1961) has attempted to explain reciprocity in terms of stimulus-response learning theory.

6. Goldman (1972:70) describes similar communication rules for domestic politics.

7. Parallel themes run through a recent article by Turpin, who states, for example, ". . . that when situations arise in the course of conducting 'foreign relations' which impinge on the President's sphere of 'power,' the State Department is shunted away from the controls. As the then Dominican Desk Officer is reported to have said of the 1964 crisis, "On Friday I was Dominican Desk officer; by Friday night Rusk

was; and by Sunday noon Lyndon Johnson was." (1972:57).

8. Personal and domestic political interests, for instance, are especially important as well; so also are shared conceptions of the national interest.

9. The authors recognize that relatively large bodies of literature exist concerning both organization theory and the importance of bureaucratic considerations in determining foreign policy. It is not our intent to minimize the importance of any of these works. However, within the scope of this article any really thorough review of this literature seems impossible, as does any detailed development of the bureaucratic politics paradigm. Fortunately, as George (1972:Fn. 29) has pointed out with respect to the area of bureaucratic considerations, "Graham T. Allison has brilliantly codified and explicated much of the previous literature on bureaucratic politics by writers such as Linblom, Neustadt, Schilling, Hammond, Huntington, [and] Hilsman." Thus one may, by examining Allison's book, get a good overview of the earlier work.

10. A dismissed regime could, of course, be replaced by one pledged to continue its predecessor's policies. Since the regime is different, we would still classify such an event as a power transfer. In addition, it seems likely that the new regime would involve itself actively in the foreign policy process in order to assure itself that continuity was, in fact, being maintained. Along with this involvement would probably go (at least initially) an increased sensitivity to whether the outputs chosen were successful or not, even though the criteria for success may have been carried over from the previous regime.

11. The term "popular support", as used here, should be taken to mean mass or parliamentary support in western style democracies, and support of the influential elites in other forms of government.

12. Economic problems serve as a good example here. Consider the current problems of senior officials and government agencies in the United States who, because of popular concern, must be more attentive to the balance of payments and to trade policy on some occasions and to domestic unemployment and to inflation on others. Regardless of whether or not the problems are related, the agency is likely to shift the bulk of its command and control resources from one area to another in the face of significant domestic concern (especially during election years).

## BIBLIOGRAPHY

- ALLISON, G.T. (1971) *Essence of Decision: Explaining the Cuban Missile Crisis*. Boston: Little, Brown.
- AND M.H. HALPERIN (1972) "Bureaucratic Politics: A Paradigm and Some Policy Implications." *World Politics*. Supplement to Vol. XXIV.
- ASHBY, W.R. (1952) *Introduction to Cybernetics*. New York: Barnes and Noble.
- AZAR, E.A. (1970) "Profiling and Predicting Patterns of Inter-Nation Interactions: A Signal Accounting Model." Paper presented at the APSA Annual Meeting in Los Angeles, Ca. (September).
- BARTOS, O. (1966) "Concession-Making in Experimental Negotiations." In J. Berger, M. Zelditch, Jr., and B. Anderson *Sociological Theories in Progress*. New York: Houghton Mifflin.
- BRUNER, J.S. (1960) *The Process of Education*. Harvard University Press.
- BRUNNER, R.P. (1970) "Data Analysis, Proven Analysis and System Change." Paper prepared for the 66th Annual Meeting of APSA.
- BURTON, J. (1969) *Systems, States Diplomacy and Rules*. Cambridge University Press.
- (1968) *Conflict and Communication*. New York: Free Press.
- BUSH, R. AND F. MOSTELLER (1955) *Stochastic Models for Learning*. New York: John Wiley and Sons.
- (1951) "A Mathematical Model for Simple Learning." *Psychological Review*.
- CAIN, G. AND H. WATTS (1970) "Problems in Making Policy Inference from the Coleman Report." *American Sociological Review*, (April).

- CHERRY, C. (1957) *On Human Communications*. Cambridge: MIT Press.
- DEUTSCH, K. (1968) *The Analysis of International Relations*. Englewood Cliffs: Prentice Hall.
- (1953) *Nationalism and Social Communications: An Inquiry into the Foundations of Nationality*. Massachusetts: MIT Press.
- FORRESTER, J. (1971) "Counter Intuitive Behavior of Social Systems." *Technology Review*. (January).
- GEORGE, A.L. (1972) "The Case for Multiple Advocacy in Making Foreign Policy." *The American Political Science Review*. Vol. LXVI (September).
- GOLDMAN, R. (1972) *Contemporary Perspectives on Politics*. Princeton: D. Van Nostrand Co.
- GOULDNER, A.W. (1960) "The Norm of Reciprocity: A Preliminary Statement," *American Sociological Review*. Vol. XXV.
- HALPERIN, M.H. (1972a) *Bureaucratic Politics and Foreign Policy*. Washington, D.C.: Brookings Institution [Draft manuscript].
- (1972b) "The Decision to Deploy the ABM: Bureaucratic and Domestic Politics in the Johnson Administration." *World Politics*, Vol. XXXV.
- (1971) "Why Bureaucrats Play Games." *Foreign Policy*. No. 2.
- AND A. KANTER [Eds.] (1973) *Readings in American Foreign Policy: A Bureaucratic Perspective*. Boston: Little, Brown.
- HARARY, F. (1961) "A Structural Analysis of the Situation in the Middle East in 1956." *Journal of Conflict Resolution*.

- HIBBS, D.A. (1972) "Problems of Statistical Estimation and Causal Inference in Dynamic, Time-Series Regression Models." Paper prepared for delivery at the 1972 APSA Meetings.
- HOLSTI, O. (1965) "Perceptions of Time, Perceptions of Alternatives and Patterns of Communication as Factors in Crisis Decision-Making." *American Political Science Review*. Vol. LIX.
- , R.A. Brody and R.C. North (1968) "Perception and Action in the 1914 Crisis." In J.D. Singer (Ed.) *Quantitative International Politics: Insights and Evidence*. New York: The Free Press.
- HOMANS, G.C. (1961) *Social Behavior: Its Elementary Forms*. New York: Harcourt, Brace and Co.
- JERVIS, R. (1970) *The Logic of Images in International Relations*. Princeton: Princeton University Press.
- KENDON, A. (1967) "Some Functions of Gaze-Direction in Social Interaction." *Acta Psychologica*. Vol. XVI.
- LENG, R. (1972) "Behavioral Indicators of War Proneness in Bilateral Conflicts," A paper prepared for the 1972 Annual Meetings of APSA, Washington Hilton Hotel, Washington, D.C. (Sept. 5-9).
- LEWIN, K. (1964) *Field Theory in Social Science* D. Cartwright (Ed.) New York: Harper Torchbooks.
- MCCLELLAND, C.A. (1973) "The Beginning, Duration, and Abatement of International Crises: Comparisons in Two Conflict Arenas." In C.F. Hermann (Ed.) *International Crises*. New York: Free Press.
- (1968) "Access to Berlin: The Quantity and Variety of Events, 1948-1963." In J.D. Singer (Ed.) *Quantitative International Politics: Insights and Evidence*. New York: Free Press.



- (1967) "International Communications." In *The International Encyclopedia of the Social Sciences*. New York: MacMillen.
- (1965) "Systems Theory and Human Conflict." In E.B. McNeill (Ed.) *The Nature of Human Conflict*. Englewood Cliffs: Prentice Hall.
- AND G.D. HOGGARD (1969) "Conflict Patterns in the Interactions Among Nations" in J.D. Rosenau (Ed.) *International Politics and Foreign Policy: A Reader in Research and Theory*. New York: Free Press.
- NEUSTADT, R. (1970) *Alliance Politics*. New York: Columbia University Press.
- PHILLIPS, W.R. (1973a) "Theoretical Approaches to the Event Data Movement." Presented at the Annual Meeting of the ISA in New York (March). To appear in C. Kegley, G. Raymond, R.M. Rood and R. Skinner's (Eds.) *International Events and the Comparative Analysis of Foreign Policy*.
- (1973b) "The Conflict Environment of Nations: A Study of Conflict Inputs to Nations in 1963." In J. Wilkenfeld (Ed.) *Conflict Behavior and Linkage Politics*. New York: David McKay.
- (1973c) "International Communications." Forthcoming in M. Haas (Ed.) *Behavioral International Relations* (Chandler Press).
- (1971) "The Dynamics of Behavioral Action and Reaction in International Conflict." Papers of the Peace Research Society.
- AND P.T. CALLAHAN (1973) "Dynamic Foreign Policy Interactions: Some Implications for a Non-Dyadic World." Ohio State University mimeo.
- AND R.C. CRAIN (1972) "Dynamic Foreign Policy Interactions," University's Mershon Center mimeo (August).

- POPPER, K. (1959) *The Logic of Scientific Discovery*. New York: Harper Torchbooks.
- PRUITT, D. (1969) "Stability and Sudden Change in Interpersonal and International Affairs." In J.N. Rosenau (Ed.) *International Politics and Foreign Policy: A Reader in Research and Theory*. New York: Free Press.
- (1968) "Reciprocity and Credit Building in a Laboratory." *Journal of Personality and Social Psychology*. Vol. VIII.
- (1965) "Definition of the Situation as a Determinant of International Action," in H.C. Kelman (Ed.) *International Behavior: A Social-Psychological Analysis*. New York: Holt, Rinehart and Winston.
- RAINIO, K. (1966) "A Study of Sociometric Group Structure: An Application of a Stochastic Theory of Social Interaction." In Berger, Zelditch and Swanson, *Sociological Theories in Progress*. New York: Houghton Mifflin.
- RUMMEL, R.H. (1971) "A Status Field Theory of International Relations." DON Research Report # 50.
- (1965) "A Field Theory of Social Action with Application to Conflict Within Nations." *General Systems: Yearbook of the Society for General Systems Research*, Vol. X.
- (1963) "Dimensions of Conflict Behavior Within and Between Nations." *General Systems: Yearbook of the Society for General Systems Research*. Vol. VIII.
- SHELLING, T.C. (1960) *The Strategy of Conflict*. New York: Oxford University Press.

- SHANNON, C.E. AND W. WEAVER (1949) *The Mathematical Theory of Communication*. Urbana: University of Illinois Press.
- SMOKER, P. (1969) "A Time Series Analysis of Sino-Indian Relations." *Journal of Conflict Resolution*. Vol. XIII (June).
- TANTER, R. (1972) "Internal System and Foreign Policy Approaches: Implications for Conflict Modeling and Management." *World Politics*. Vol. XXIV.
- TAYLOR, D.A. (1965) "Some Aspects of the Development of Interpersonal Relationships: Social Penetration Processes." University of Delaware, unpublished doctoral dissertation.
- TOGNOLI, J.J. (1967) "Reciprocal Behavior in Interpersonal Information Exchange." University of Delaware, unpublished doctoral dissertation.
- TOULMIN, S. (1953) *The Philosophy of Science*. New York: Harper & Row.
- TURPIN, W.N. (1972) "Foreign Relations, Yes; Foreign Policy, No." *Foreign Policy*. Vol. VIII.
- WIENER, M. (1950) *The Human Use of Human Beings*. Boston: Houghton Mifflin.
- WRIGHT, Q. (1955) *The Study of International Relations*. New York: Appleton-Century-Crofts.
- ZINNES, D. (1968) "The Expression and Perception of Hostility in Prewar Crisis: 1914," in J.D. Singer (Ed.) *Quantitative International Politics: Insights and Evidence*. New York: Free Press.

Figure 1: A Triad

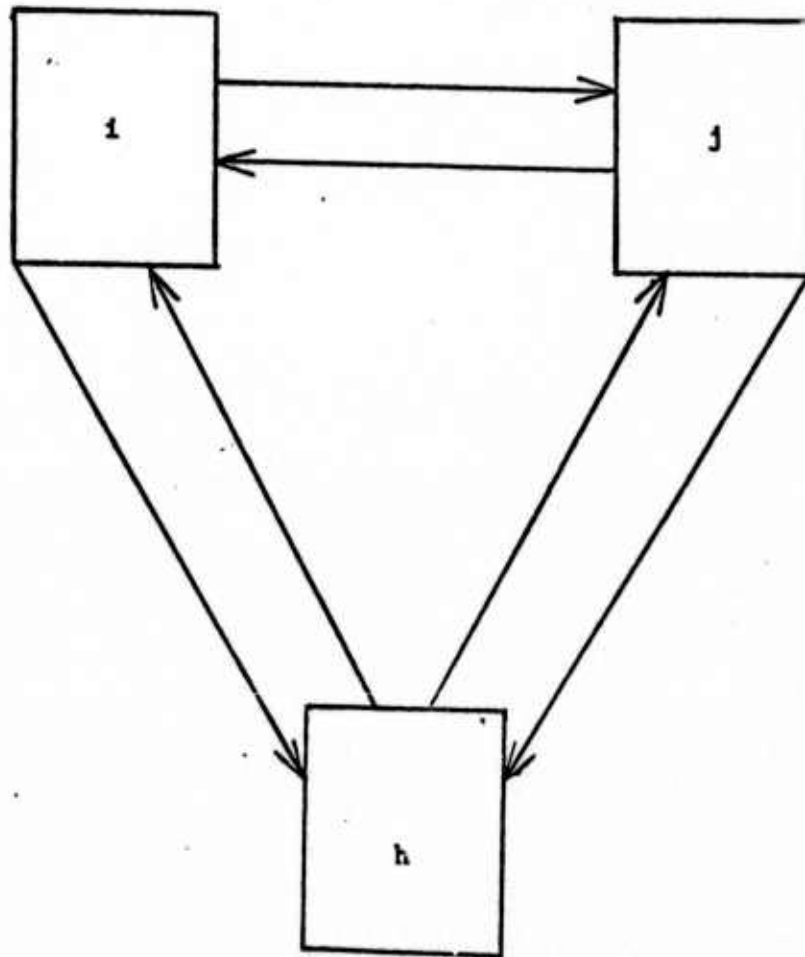


Table 1

Impact of Goals, Strategies and Dyadic Patterns  
on Probability of i Choosing j as Target Next Time

Dyadic Pattern	$i j^1$		$\bar{i} j^2$		$i \bar{j}^3$		$\bar{i} \bar{j}^4$	
	I <sup>5</sup>	II <sup>6</sup>	I	II	I	II	I	II
Reinforcement	Increase	Increase	Decrease	Increase	Decrease	Decrease	Increase	Decrease
Strategy								
Conversion	Decrease	Decrease	Increase	Decrease	Increase	Increase	Decrease	Increase

- 1 i cooperative with j and j cooperative with i
- 2 i conflictual to j and j cooperative with i
- 3 i cooperative with j and j conflictual to i
- 4 i conflictual to j and j conflictual to i
- 5 seek consistent relations
- 6 seek cooperative relations

Table 2

	A	1
	B	1
	C	1
BEHAVIOR	D	1
TYPE	E	1
	F	1
	G	1
	H	<u>1</u>
TOTAL		8
HREL		1.0

Table 3

	A	0
	B	0
	C	0
BEHAVIOR	D	4
TYPE	E	4
	F	0
	G	0
	H	<u>0</u>
TOTAL		8
HREL		0.33