THE USE OF INTERNATIONAL ALIGNMENT IN A LONG-RANGE FORECASTING MODEL

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13. ABSTRACT

International alignment is defined as the degree to which two nations share similar attitudes or patterns of behavior with respect to some mutually salient third nation or group of nations. In the European context, the United States and the Soviet Union are the most plausible salient nations. The nations of Europe will be considered aligned to the extent that they behave similarly toward the two major powers.

In addition, a modified bipolar schema will be used to determine the extent to which the European nations are aligned with the United States or with the Soviet Union. Forecasts of nations' alignments with these two powers will suggest the degree to which the present divisions of the European continent are expected to continue in the future. These forecasts will be used to infer the potential for European nations to act, in unison, as a third major power.

Predictors of alignment patterns include the degree of internal turmoil and revolution, nations' economic and military power bases, their total international conflict, and their comparative levels of conflict with the United States and the Soviet Union. In addition, expected patterns of trade with these two major powers will serve as a predictor of European nations' alignment patterns. Predictors of alignment patterns include comparative distances from the United States and the Soviet Union and nations' polity types.

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I. INTRODUCTION: MODELS OF INTERNATIONAL ALIGNMENT

The concept of alignment among nation states has long been an important subject in the traditional literature of international relations. More recently, that concept has also been the object of examination by quantitatively-oriented political scientists. Our objective here is to describe and forecast the alignment patterns of selected European nations for the 1980's. In this respect, we will endeavor to both measure and predict the alignment patterns of European nations with major powers, in this case the United States and the Soviet Union, as well as the patterns among those European nations themselves. Such an objective requires two basic research steps. First, we must develop adequate quantitative measuring instruments for describing international alignment. Second, we must search for means to forecast patterns of major power and dyadic alignments in the European context during the 1980's.

A. HOSTILITY-FRIENDSHIP VS. COGNITIVE DISSONANCE ALIGNMENT MODELS

Although popular literature often equates the two concepts, theoretical social scientists have taken great pains to distinguish between alignments and alliances. Sullivan notes:

> Alignments in no way share the permanency of formal alliances nor are they as global. Alignments refer to specific behaviors engaged in by groups of nations which are directed toward a common set of objects. They involve the coordination of behaviors in response to a particular issue in the same time period and involve either some form of explicit agreement and

coordination or acting in a similar manner in an attempt to deal with some problem.[1]

Thus alignments may either cause or result from formal alliances; at the same time they can be distinguished from alliances and thus be analyzed differently.[2] While forecasting alignments therefore requires differentiating them from formal alliances, such a distinction does little to define alignment in any complete sense.

Leavitt discusses two kinds of definitions[3] most frequently utilized in the theoretical and empirical literature on international alignments. The first of these is "hostility-friendship":

- Two nations are aligned if they behave in a relatively friendly or cooperative manner towards each other.

Teune and Synnestvedt utilize a hostility-friendship alignment model in their empirical examination of international alignments.[4] Such a model uses as indicators of alignment only interactions between those nations for which alignment measures are desired. Thus Teune and Synnestvedt use military alliances, visits by heads of state and other

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[1] John D. Sullivan, "The Dimensions of United States Alignments in the Third World (paper presented at the International Studies Association meetings, Pittsburgh, Pennsylvania, April 2-4, 1970), p. 1.

[2] Ibid., p. 2.

[3] Michael R. Leavitt, "A Framework for Examining the Causes of International Alliance" (Madison, Wisconsin: University of Wisconsin, July 1972). (Mimeographed.)

[4] Henry Teune and Sig Synnestvedt, "Measuring International Alignments" (Philadelphia, Pennsylvania: University of Pennsylvania Foreign Policy Research Monograph Series No. 5, 1965).

important dignitaries, protests and/or expulsions of diplomatic personnel, and education and cultural exchanges.

Alternatively, Leavitt identifies the "cognitive dissonance" definition of international alignment:

- Two nations are aligned if they behave similarly towards one or more mutually salient third nation.

Sullivan utilizes a cognitive dissonance alignment model in his examination of United States alignments with underdeveloped nations.[5] This model views the total pattern of a nation's actions in the international system as an indicator of its alignment tendencies. The degree to which the nation acts in a friendly or hostile manner toward another nation is essentially irrelevant as a measure of alignment with that nation except as such activity is part of the nation's total activity in the international system. Thus, indicators such as United Nations voting patterns, statements made or actions taken with respect to a third nation, or the system-wide distribution of a nation's formal alliances are useful measures when employing this model.

On the surface, the hostility-friendship alignment definition seems quite satisfactory. Intuitively, we find it difficult to imagine that aligned nations would be relatively hostile toward one another, and nearly as difficult to believe that totally unaligned nations may act in a friendly manner towards one another. However, the observation of friendly and/or hostile acts between nations depends entirely on whether they interact at all. That is, nations that do not interact with one another cannot be judged as to whether they act in a friendly or

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[5] Sullivan, "The Dimensions of United States Alignments in the Third World."

hostile manner towards each other. This is a genuine problem in the context of Europe; some pairs of nations evidence very high levels of interaction, while others show almost none. The hostility-friendship model, then, offers no baseline of interaction against which to generate relative hostility and relative friendship scores.

The cognitive dissonance alignment model, on the other hand, can be easily operationalized and is amenable to empirical examination in the European context. In this approach, unaligned nations will show different patterns of behavior vis-a-vis some mutually salient third nation or group of nations. That is, as nations demonstrate greater similarity in their behavior toward that third nation or group of nations, they are considered more aligned with one another.[6]

For our purposes, the cognitive dissonance model promises to be more useful than a hostility-friendship model. Consequently, our examination of the patterns of international alignment within Eastern and Western Europe, and our forecasts of those patterns for the 1985-1994 time period, will employ the cognitive dissonance model. Specifically, we will consider the European nations aligned to the extent that they share similar patterns of behavior toward two mutually salient third nations. In this respect, we consider the United States and the Soviet Union to be ideal countries; not only are they salient third nations for all European polities, but each is the subject of a large number of policies and

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[6] The mutual salience of the third nation, or set of nations, in turn assures a level of interaction sufficient for measuring behavioral patterns. If a mutually salient third nation is one with which both nations of interest interact, the similarities and differences in their patterns of interaction can be used to measure their interaction. In short, this is a two-stage model that uses measures of hostility and friendship as basic indicators, but introduces control for differential levels of interaction.

actions by European nations. Consequently a postdictive model of international alignment may be generated for those nations, and a well-grounded forecasting model of alignment for Eastern and Western Europe should result.

B. DYADIC VS. BIPOLAR ALIGNMENT MEASURES

So far we have assumed that measures of alignment among all of the European nations will be sufficient for our forecasting needs. That is, we have regarded alignment only as a dyadic phenomenon and have considered the construction of alignment scores for each pair of nations in Eastern and Western Europe. This view differs from that often found in the popular press, where alignment is seen as a bipolar phenomenon, and nations are viewed as aligned with either the United States or the Soviet Union. Clearly, each nation's degree of alignment with the United States and with the Soviet Union is useful for public policy purposes, and forecasts of this aspect of alignment are of potential value to the national security community.

Unfortunately, bipolar alignment patterns are too often one-dimensional; that is, alignments with the United States and the Soviet Union are considered mutually exclusive patterns of behavior. Such a conceptualization cannot, of course, differentiate types of non-alignment or multi-alignment. When using a single scale, one cannot determine whether a nation that lies in the middle of the scale is unaligned, i.e., has no ties to either major power, or is aligned to some extent with both, perhaps with respect to different issues. To the extent that a bipolar alignment view is both theoretically interesting and practically useful, the ability to consider the alignment of a nation with both major powers independently would further enhance its value.

In short, we seek a measure of international alignment for the polities of Eastern and Western Europe that can yield information about the patterns of dyadic alignments among European nations, the extent of individual European nations' alignments with major powers, and the distribution of these major power alignments between the United States and the Soviet Union. It is with these purposes in mind that the use of behaviors and policies vis-a-vis the United States and Soviet Union become even more appealing. Nations' policies and actions toward these major powers can directly yield information about the extent of their major power alignments and the distribution of their major power alignments between the United States and the Soviet Union, while comparisons of different nations' major power alignments can yield information about the patterns of alignments among them.[7]

Essentially, then, we will use a modified bipolar alignment schema for determining whether the nations of Eastern and Western Europe tend to align themselves with the two most salient major powers in the area, the United States and the Soviet Union. In addition, we will use this schema to distribute each nation's major power alignment between these two salient powers. If two European nations are considered aligned to the degree that they exhibit similar behaviors with respect to one or more salient third nation, then a comparison of scores on the modified bipolar alignment schema can be used to describe the patterns of alignment among those European nations.

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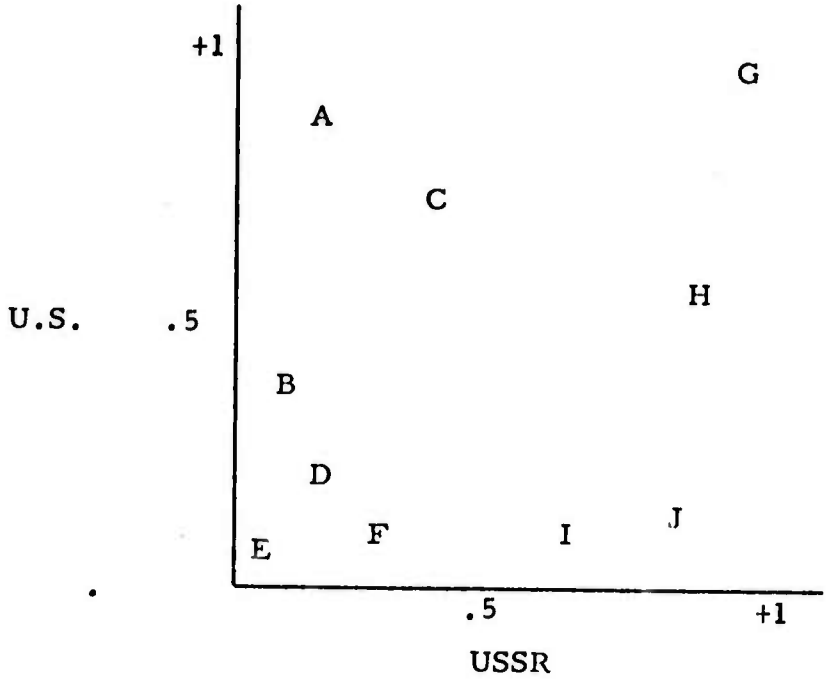
[7] The extent and distribution of nations' major power alignments, then, will be measured within the context of the hostility-friendship model, where the focus on major powers introduces some controls for differential levels of interaction. Examination of the patterns of European nations' alignments with one another is best done, as we noted earlier, using a cognitive dissonance model which retains those controls.

II. MEASURING INTERNATIONAL ALIGNMENT

We represent alignment on a two-dimensional plane, thus moving away from the single-dimensionality of most bipolar alignment schema. Two scores are produced for each nation to indicate its degree of alignment with the United States and with the Soviet Union respectively. One can consider the two scores as coordinates which define a given point on the plane, as shown below. The letters mapped onto the plane represent hypothetical nations, A to J, and they indicate visually the degree of alignment with each of the major powers utilized as salient



third nations. Thus the score for nation E (0.0, 0.0) suggests that the nation was not aligned with either of the powers; nation G's score of (1.0, 1.0) suggests that it was completely aligned with both major powers, while a score of (1.0, 0.0) suggests complete alignment with

the Soviet Union and no alignment at all with the United States. Needless to say, this model can be logically extended to accommodate any number of major powers with which one might want to measure a nation's alignment. The use of two dimensions here is contextually specific to Eastern and Western Europe; that is, the United States and the Soviet Union are two clearly salient powers for all European nations, whereas no other power seems to clearly fit that category.

A. U.N. VOTES AS MEASURES OF ALIGNMENT

Initially, we will include two paired components in composite alignment scores for each nation. The first set of components will be the percentage of United Nations General Assembly votes in agreement with the United States and in agreement with the Soviet Union respectively. United Nations votes are aggregated here according to the year in which they were cast. Since the General Assembly sessions normally begin in the fall and adjourn the following spring, the voting computed for a given year may actually come from two different General Assembly sessions. Although this treatment of United Nations roll call data differs somewhat from normal practices, it is necessary to insure comparability between the roll call data and other data sets that are aggregated by calendar year. Of course, only roll call votes could actually be considered in the construction of this part of the alignment scores, since voice votes or hand votes do not identify the position taken by a given state. Furthermore, only those roll calls on which the United States or the Soviet Union took an identifiable position were used to determine whether a given nation's voting was in agreement with either or both of them.

There are of course shortcomings in using United Nations voting data as measures of international alignment; for example, a vote in agreement with the United States may not necessarily indicate alignment with the United States. Nonetheless, the patterns of United Nations voting over the years do indicate the degrees to which nations find themselves in agreement with major powers. Since policy statements by national leaders are rarely precise enough to allow either a reduction to quantitative terms or a comparison with other leaders' statements, United Nations votes are particularly important as a public forum where nations take clearly identifiable and comparable policy positions. Thus, Russett notes:

> Roll-call votes provide an especially useful means of identifying states' attitudes. They occur on a very wide variety of issues, they are numerous, and they force a state to take a position.[1]

There are several specific difficulties with the use of United Nations roll call votes as indicators of international alignment, not the least of which is that we have no satisfactory way to decide which roll calls are most and which are least "important." Nor have we any means to measure the intensity of a particular nation's position.[2] There are, in addition, particularly severe difficulties when using United Nations votes of African,[3] and perhaps Latin American nations. There is, however, some evidence to suggest that these roll calls are a useful

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[1] Bruce Russett, Trends in World Politics (New York: Macmillan & Co., Inc., 1965), p. 67.

[2] Ibid.

[3] Thomas Hovet, Africa in the United Nations (Evanston, Ill.: Northwestern University Press, 1963), p. 181.

measure of alignment patterns with the major powers, especially in the context of Eastern and Western Europe.

In a 1965 project undertaken by Henry Teune and Sig Synnestvedt, a group of 126 political scientists, including both "area specialists" and international relations "generalists," were asked to rate the degrees of alignment of 119 nations with the United States and the Soviet Union.[4] Teune and Synnestvedt then examined those issues in the 1963 United Nations sessions on which the United States and the Soviet Union disagreed and found that the countries considered most aligned with the United States cast 95% of their votes with the United States while countries thought to be most aligned with the Soviet Union voted with it 94% of the time. This study suggests that United Nations voting data are a useful, readily-obtainable indicator of international alignment, at least with respect to these major powers.

B. OTHER COMPONENTS OF THE ALIGNMENT SCORES

Teune and Synnestvedt maintain, however, that international alignments are composed of two rather distinct dimensions: the diplomatic dimension and the military dimension. While they regard United Nations roll calls as a quite useful measure of the diplomatic dimension of alignment, they maintain that the military dimension requires a measure of the degree to which nations collectively view their national security.[5] Accordingly, the percentage of a nation's military treaties with the United States and the Soviet Union respectively is used as the pair of measures of the military dimension of alignment.

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[4] Teune and Synnestvedt, "Measuring International Alignments."

[5] Ibid.

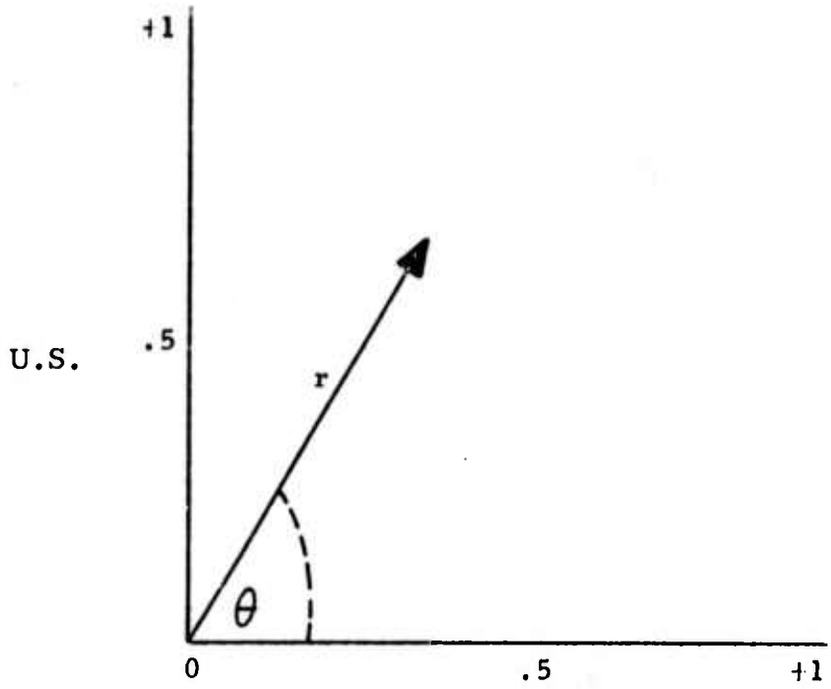
In the context of Eastern and Western Europe this pair of measures is often mutually exclusive; that is, nations that have military treaties with the United States do not have such commitments with the Soviet Union, and vice versa. For some of the European nations - Czechoslovakia, Finland, Hungary, Italy, Romania and Yugoslavia - this condition does not hold.

Composite pairs of alignment scores were computed for each European nation by finding the mean of the alignment scores for the diplomatic and military dimensions. It is these composites that we utilize in the following analyses.

III. USES OF THE MEASURES

We have so far considered only the components of the raw alignment measures: the coordinates representing each nation on the plane dimensioned by the salient major powers, the United States and the Soviet Union. We now direct our attention to the way these measures can be utilized to produce three kinds of information about the alignments of the European nations: information about patterns of alignment of the European nations with one another, information about the extent to which they are aligned with major powers, and information about the distribution of their major power alignments between the United States and the Soviet Union. The first of these, the patterns, can be determined directly from the raw coordinates. If each nation is represented as a point on that plane described above, then the distance between any two points represents the degree to which those two nations are aligned. Distance vectors will be computed for each pair of European nations, and will be used as dyadic measures of alignment. These measures range from zero (identical major power alignments) to approximately 1.414 (diametrically opposed alignments).

In addition to examining a nation's coordinates directly, we derive the extent and distribution of major power alignments by considering the characteristics of a vector that originates at the point (0.0, 0.0) and ends at a given nation's coordinates. The length of this vector, r, serves as a measure of the extent to which the nation is aligned with major powers; the angle of the vector, θ, represents the distribution of that alignment between the United States and the Soviet Union. Thus a nation whose coordinates lay quite close to the point (0.0, 0.0) has a very short vector, and is therefore relatively unaligned with respect to



the major powers. In a similar manner, a nation whose vector has an angle of 0^{o} from the horizontal axis is one hundred percent aligned with the Soviet Union, while a nation whose vector has an angle of 90^{o} from the horizontal axis distributes its major power alignment completely with the United States. A nation whose vector has an angle of 45^{o} is, of course, equally aligned with both major powers.

Specifically, the length of the vector, r, has a range from 0 to approximately 1.414. The cosine of the angle of the vector has a range of 0.0 to 1.0. The cosine of the angle will equal 1.0 when the vector lies along the horizontal axis, and 0.0 when it lies along the vertical axis. Thus, when the cosine equals 1.0 a nation apportions its major power alignment completely with the Soviet Union; when the cosine equals 0.0 the nation apportions its major power alignment completely with the United States.

This schema allows us to distinguish patterns of non-alignment or multi-alignment with the major powers. Two nations, for example, could have vectors with an angle of 45° from the horizontal. If a single-dimensional scale were used, both nations would lie in the middle of the scale and we could make no distinctions between the extent or distribution of their major power alignments. Obviously, however, one of the nations may be completely unaligned with the major powers and have a vector of very short length, while the other may be highly aligned with both and have a relatively long vector. The two-dimensional approach, then, permits us to distinguish these types of situations from one another.

Note that the distance vector between two points on the original plane, representing the degree of alignment of any two European nations, is also the distance vector between the end points of any two vectors. Thus, once forecasts of the length and angle of a pair of vectors are generated, the degree to which those two nations are aligned can be easily computed. This is precisely what will be done; forecasts will be made of the length and angle of the alignment vector for each European nation. These forecasts will then be used to compute expected <u>patterns</u> of alignment among the European nations themselves.

Let us emphasize that this usage is consistent with the cognitive dissonance model of alignment discussed earlier. That model considers two nations aligned to the extent that they share common positions or behaviors vis-a-vis some third salient nation or group of salient nations. The two major powers, the United States and the Soviet Union, serve here as the salient nations, and alignments among the European nations are determined by the similarity of their United Nations voting patterns and military commitment patterns with respect to those major powers.

IV. PREDICTORS OF INTERNATIONAL ALIGNMENT

A. OTHER CENTRAL ENVIRONMENTAL DESCRIPTORS

1. Previous Alignment Patterns

Several theorists have suggested that patterns of international alignment are primarily a function of previous international alignment.[1] Specifically, we suggest that the extent of a nation's major power alignment, the length of its alignment vector, is predicted in part by its previous level of major power alignment, and that the distribution of a nation's major power alignment, the angle of its alignment vector, is a function of its previous distribution of major power alignment.

2. Internal Instability and National Power Base

Liska has suggested that nations facing internal instability will seek alignments with major powers for two primary reasons.[2] First, major

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[1] See John D. Sullivan, "Cooperating to Conflict: Sources of Informal Alignments," in Peace, War, and Numbers, ed. by Bruce M. Russett (Beverly Hills: Sage Publications, Inc., 1972), pp. 115-138; Bruce M. Russett, "Components of an Operational Theory of International Alliance Formation," Journal of Conflict Resolution, Vol. 12 (1968), pp. 285-301; Norman J. Padelford and George A. Lincoln, The Dynamics of International Politics (New York: The Macmillan Company, 1962); Bruce M. Russett and W. C. Lamb, "Global Patterns of Diplomatic Exchange," Journal of Peace Research, Vol. 3 (1969), pp. 37-55; and Bruce M. Russett, International Regions and the International System (Chicago: Rand McNally and Co., 1967).

[2] George Liska, Nations in Alliance (Baltimore: The Johns Hopkins Press, 1962).

power alignments give the nation's government additional legitimacy within the nation. The notion here is that as a nation's regime is more aligned with major powers, it is viewed as a more legitimate government by those powers. This additional legitimacy will be translated into the domestic arena so that more of the nation's citizens will also view the regime as legitimate. In addition, such alignments free resources, especially military resources, from external defense requirements so that they can be used in the suppression of internal instability. Since instability usually requires force for suppression, it may prompt a nation to seek alignments that allow reallocation of military resources to that purpose. This relationship is mediated by the level of a nation's power base, however, inasmuch as nations with large military resources, and large economic power bases that can be transformed into military resources, are more able to maintain large external defense forces and large internal suppression forces simultaneously. That is, instability is hypothesized to be directly related to the extent to which a nation is aligned with major powers; but this relationship is hypothesized to be important primarily for nations with relatively small national power bases.

3. Economic Interdependence

Several theorists have linked patterns of international alignments to patterns of trade among nations.[3] Sullivan, in particular, notes that aside from past patterns of alignment, international trade patterns are

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[3] See Russett and Lamb, "Global Patterns"; Russett, International Regions and the International System; and Teune and Synnestvedt, "Measuring International Alignments."

the most important predictors of international alignments.[4] Consistent with generating forecasts about relative patterns of policy and behavior vis-a-vis the United States and the Soviet Union, we suggest that the distribution of a nation's major power alignment between those two nations will vary directly with the proportion of its trade with each of the two nations. Since the cosine of the angle of the alignment vector is to be forecast, and since the cosine of an angle varies inversely with the size of the angle itself, we hypothesize that:

$$\cos\theta = f\left(\frac{\text{proportion of trade with USSR}}{\text{proportion of trade with U.S.}}\right),$$

i.e., the greater the proportion of trade with the Soviet Union, the smaller the angle, θ, and the greater the cosine of that angle.

4. International Conflict

The remaining central environmental descriptor, international conflict, is hypothesized to affect both the extent to which nations will align with major powers and the distribution of nations' major power alignments between the United States and the Soviet Union. Liska suggests that intense international conflict is the primary determinant of whether nations will seek international alignments,[5] although much empirical research indicates that intense conflict has but secondary importance as a predictor of alignment tendencies.[6] The thrust of the familiar

[4] Sullivan, "Cooperating to Conflict."

[5] Liska, Nations in Alliance.

[6] Sullivan, "Cooperating to Conflict."

argument here is that nations that are engaged in international conflict will attempt to supplement their abilities to deal with that conflict by aligning themselves with major powers. This hypothesis requires qualification, however, and the lack of this qualification in previous empirical research may account for weak observed linkages between conflict and alignment tendencies. Specifically, we suggest that it is more likely for nations involved in new conflicts to seek such alignments. That is, nations involved in conflicts for an extended period of time probably will not seek major power alignments because of the continued existence of those conflicts; but nations that become embroiled in new conflicts will do so. We regard this as one way to incorporate Leavitt's hypothesis that threats constitute the most important cause of alignment formation.[7] That is, because new conflicts involve great uncertainties, they are viewed as more of a threat to a nation than are old, continuing conflicts where the level of uncertainty is much lower. A measure was constructed to test this hypothesis by controlling the level of present conflict by the level of previous conflict. Specifically,

$$\frac{\text{conflict at time } t}{\text{conflict at time } t-1}$$

is hypothesized to be positively related to the extent of a nation's major power alignment.

The distribution of a nation's major power alignment between the United States and the Soviet Union is also viewed as a function of conflict. Specifically, a nation's distribution of major power alignment is regarded as a function of the proportion of its conflict with the Soviet

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[7] Leavitt, "A Framework for Examining the Causes of International Alliance."

Union relative to the proportion of its conflict with the United States. Again, since the cosine of an angle is inversely proportional to the size of that angle in degrees,

$$\cos \theta = f\left(\frac{\text{proportion of conflict with U.S.}}{\text{proportion of conflict with USSR}}\right)$$

Thus, as a nation has proportionately more conflict with the United States than with the Soviet Union, it is expected to align more with the Soviet Union than with the United States. Conversely, a nation that has more conflict with the Soviet Union than with the United States is expected to align more with the United States.

B. EXOGENOUS PREDICTORS OF INTERNATIONAL ALIGNMENT

Consistent with our methodological orientations in constructing an integrated forecasting model for these five central environmental descriptors, we have considered two types of predictors. The first are predictors hypothesized to affect measures of alignment more or less instantaneously. This class of predictors includes the other four central environmental descriptors, for which values will be forecast simultaneously with the forecasting of international alignment measures. In addition, we have considered a class of long-lagged exogenous variables, predictors whose impact on alignment is observed some substantial time after their values are observed. Thus, if X were a long-lagged exogenous predictor of alignment with a lag of 15 years, we would hypothesize that the value of X in 1970 is related to the nation's alignment score in 1985. Two long-lagged exogenous variables are initially examined as potentially useful predictors of alignment.

1. Proximity

Sullivan and Russett have argued that geographical proximity plays a role in determining the alignments of nations.[8] The argument is based upon the notion that nations near one another share common regional problems; these common problems lead to the search for common solutions, or common positions, which constitute indicators of alignment. Specifically, Sullivan has utilized air miles between capitals as a measure of the proximity of nations and has found that nations are more likely to be aligned with one another as that distance decreases.[9] Consistent with Sullivan's usage, we suggest that the distribution of a nation's major power alignment is positively related to the relative distances from that nation to the United States and the Soviet Union, as measured by air miles between capitals. That is, the longer the distance from a nation to the Soviet Union relative to its distance to the United States, the more likely that nation is to be aligned with the United States. Conversely, nations closer to the Soviet Union relative to their distance to the United States are more likely to be aligned with the Soviet Union. Again, since the cosine of an angle is inversely related to the size of that angle in degrees, and since an angle of zero degrees in a nation's alignment vector corresponds to that nation's allocation of all its major power alignment to the Soviet Union, we hypothesize that the measure,

$$\frac{\text{distance from U.S.}}{\text{distance from USSR}}$$

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8 Sullivan, "Cooperating to Conflict," and Russett, International Regions and the International System.

9 Sullivan, "Cooperating to Conflict," p. 127.

will be positively covariant with the cosine of the angle of the nation's major power alignment vector, where distance is measured by air miles between capitals.[10]

2. Polity-Type Similarity

In a like manner, several theorists have argued that nations with similar polity types are more likely to be aligned with one another.[11] Consistent with previous usage, we will utilize Banks and Gregg's polity-characteristic typologies,[12] in which all the European nations are identified as either "centrist" or "polyarchic." Since the Soviet Union and the United States are identified as centrist and polyarchic respectively, we suggest that centrist nations are more likely to align with the Soviet Union and polyarchic nations are more likely to align with the United States. By creating a polity-type dummy variable, scoring centrist nations with "1" and polyarchic nations with "0," this theory can be tested by relating the polity-type dummy variable to the cosine of the angle of a nation's major

[10] Since the universe of nations is limited to Europe, we, of course, expect all nations to be closer geographically to the Soviet Union than to the United States (thus this ratio will always be greater than 1.0). However, we are concerned here with the relative distances, so the universal proximity to the Soviet Union will not be important.

[11] Russett and Lamb, "Global Patterns"; Russett, International Regions and the International System; Russett, "Components of an Operational Theory"; H. S. Dinerstein, "The Transformation of Alliance Systems," American Political Science Review, Vol. 54 (1965), pp. 589-601; William A. Gamson, "A Theory of Coalition Formation," American Sociological Review, Vol. 26 (1961), pp. 373-382; and Sullivan, "Cooperating to Conflict," p. 127.

[12] Arthur S. Banks and Phillip M. Gregg, "Grouping Political Systems: Q-Factor Analysis of A Cross Polity Survey," The American Behavioral Scientist, Vol. 9 (1965), pp. 3-6.

power alignment vector. Specifically, then, we hypothesize that the cosine of a nation's alignment vector is positively related to its score on the Banks and Gregg polity-type measure.

V. STRUCTURE OF THE ALIGNMENT EQUATIONS

Multiple regression analysis will be the basic technique utilized to generate a postdictive model for each facet of major power alignment, the extent of nations' major power alignments and the distribution of those alignments between the United States and the Soviet Union. Each of the predictor variables discussed above will be examined to determine if it is a useful predictor within the context of Eastern and Western Europe. For those variables that are useful as predictors, estimates of the direction and magnitude of their linkages with international alignment measures will be generated. Those estimates will be used, along with known values of the long-lagged exogenous predictors and forecast values of the other central environmental descriptors, to generate forecasts of the alignment measures for the 1985-1994 time period. Once forecasts of the extent and distribution of nations' major power alignments have been made, computations will yield predictions about the patterns of alignment among the European nations themselves during the 1980's.

Six predictor variables, four of which are other central environmental descriptors, have been selected for examination as useful for the forecasting of international alignment patterns. These six variables will be used in two alignment equations; one equation for the extent of nations' major power alignments, the length of their alignment vectors; and the other for the distribution of their major power alignments between the United States and the Soviet Union, the cosine of the angle of their alignment vectors. The equations will then be evaluated for explanatory power, and will be altered, if necessary, consistent with criteria for good estimation. Parameter estimates developed from the final equations

will then be utilized to generate forecasts of the length and cosine of the angle of nations' alignment vectors for the 1985-1994 period.

$$Y_1 = \beta_{10} + \gamma_{11} Y_{1_{t-1}} + \gamma_{12} \frac{Y_2}{Y_3 + Y_4} + \gamma_{15} \frac{Y_{5_t}}{Y_{5_{t-1}}} + \epsilon_1$$

and,

$$Y_0 = \beta_{00} + \gamma_{00} Y_{0_{t-1}} + \gamma_{06} \frac{Y_6(\text{USSR})}{Y_6(\text{U.S.})} + \gamma_{05} \frac{Y_5(\text{U.S.})}{Y_5(\text{USSR})} + \beta_{01} \frac{X_1}{X_2} + \beta_{03} X_3 + \epsilon_0$$

where:

Y_0 = cosine vector angle

Y_1 = vector length

Y_2 = internal instability (turmoil + revolution)

Y_3 = military power base

Y_4 = economic power base

Y_5 = international conflict

Y_6 = economic interdependence

X_1 = distance from U.S.

X_2 = distance from USSR

X_3 = dummy indicating polity type

We intend to evaluate these equations for the length and cosine of the angle of nations' alignment vectors with a view toward removing those predictors which do not, in fact, evidence strong linkages with the characteristics of the nations' alignment patterns. Estimates of the direction and strength of the linkages for the remaining predictors will

be developed with minimum-information, maximum-likelihood methods. These estimates will be used to generate forecasts of the characteristics of nations' alignment patterns with major powers. These forecasts, then, can be transformed to produce distance vectors between the coordinates for any two nations so that the patterns of alignment among various European nations can be forecast.