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EMPIRICAL SUPPORT FOR SYSTEMIC AND DYADIC EXPLANATIONS OF INTERNATIONAL CONFLICT

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AT least since the Treaty of Westphalia, observers of international affairs have speculated that the structure of the international system influences the prospects for peace. Efforts to identify structural characteristics related to peace and war have concentrated on how power is distributed throughout the international system and on the configuration of agreements among nations that allow for the international aggregation of power.

More recently, some theorists, taking their lead from those who study decision-making processes within governments, have analyzed how the opportunities and the constraints faced by the decision makers of individual states affect national behavior. Those who approach the study of international relations from this perspective acknowledge that the sources of these opportunities and constraints reside in both domestic and international politics. By acknowledging both sources, these theorists do not assume *a priori* that there is any inherent inconsistency in the various levels of analysis. Indeed, different levels of analysis should engender no inconsistencies when there are shared subjects of study—peace, war, alliances, etc. While state-level analysts do not anticipate findings to be inconsistent with those at the system level, they, like many system theorists, prefer that system-level explanations be built up from individual-level theories. Siverson and Sullivan observe that "in future research it might be advantageous to combine theoretical propositions and findings from both the systemic and dyadic levels." And, "in terms of general theory-building it may be profitable to combine them rather than view both levels as totally distinct from one another."[1]

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[1] Randolph Siverson and Michael Sullivan, "The Distribution of Power and the Onset of War," *Journal of Conflict Resolution* 27 (September 1983), 473-94.

It is not our intention in this study to provide the theoretical linkage between the national dyad and the international system. Rather, we intend to combine the two levels empirically in an effort to evaluate the relative merits of the two approaches in terms of their ability to predict a shared theoretical concern: international conflict.

Some advocates of the balance-of-power theory believe that, when power is more or less equally distributed, the prospects for peace—or at least for the avoidance of a major, cataclysmic war—are enhanced. The concept of peace in some balance-of-power theories refers only to the absence of wars between major powers, while other balance-of-power theories view peace (or stability) as the condition in which any level of warfare is absent. Our empirical analyses take both meanings of peace into account.

The balance-of-power view is not, however, shared by all theorists concerned with structural explanations of war. Some maintain that international stability is not enhanced by a balance of power, but by the presence of a hegemonic power acting as the guarantor of peace. For these analysts, peace refers generally to the absence of war *among the great powers*. Their concern is with wars that have the potential of creating fundamental shifts in the leadership of the international community of nations. Supporters of the balance-of-power perspective often cite the experiences of post-Napoleonic 19th-century Europe as evidence for their views, while advocates of the hegemonic power perspective note the long periods of peace during the *Pax Romana* or the more recent *Pax Americana*.

The debate over the relationship between the distribution of power and the likelihood of peace is but one example of disagreement over the role of systemic structure in international affairs. An additional debate focuses on the clustering of nations into more or less cohesive blocs. Some scholars, particularly students of Soviet-American relations, draw attention to the relatively peaceful and bipolar nature of the international community in the post-World War II era. Others, noting the bipolar character of Europe just before World War I, suggest that multipolar, not bipolar, international systems have the greater potential for peace.

Closely associated with the controversy over the consequences of the number of poles in the international system is the question of the degree of cohesion, or "tightness," of the poles. It is often suggested that the degree of polarization affects the reliability of the bipolarity and the multipolarity arguments. This concern over the tightness of the poles arises, in part, from the growth in the number of states during the postcolonial era and the coincident rise in the number of newly emergent nonaligned

or neutral states. International theorists quite reasonably speculate that these nonaligned states affect the operation of any *n*-polar system. The experience of NATO in the 1960s also aroused concern over the cohesion of international alignments. France's withdrawal from the unified military command and Germany's policy of *Ostpolitik* seemed to signal a new era of independence within the alliance. Some analysts speculate that a decrease in NATO's cohesion might decrease the alliance's reliability, thereby increasing the risk of an East-West crisis.

Still other theorists are skeptical of the argument that the identified structural features of the international system are, by themselves, determinants of the behavior of nations. Individual national decision makers may well be aware of systemic features, but this knowledge serves as an imperfect guide in the conduct of international affairs. Furthermore, these theorists, as well as many system theorists, believe that greater confidence would be generated in systemic explanations if the properties of the international system were the product of carefully delineated state-level explanations that specify how structural features constrain national choices.

Until the late 1960s, structural theories were subjected to few systematic empirical tests. Studies that investigated the empirical relationship of systemic characteristics to international conflict generally focused on only one aspect of the system's structure. Adherents of systemic approaches might reasonably object that such unidimensional analyses distorted their theoretical statements. To focus on a single structural characteristic is to ignore many of the nuances that system theorists postulate. For example, Morton Kaplan identified a number of system types that are distinguished by the interdependence of such systemic characteristics as power balance, polarity, and alliance cohesion.[2]

Our objective is to examine the empirical support for the independent and joint effects of such key systemic variables. In doing so, we allow free reign to all three properties that have been postulated as being significantly related to international conflict—the distribution of power among nations, the number of poles in the system, and the tightness of these poles. After describing the properties, we shall combine the variables to capture the extant hypotheses and to develop new ones.

The major hypothesis drawn from the theory of the balance of power is that, as the distribution of power in the international system (or among the essential states) approaches equality, the potential for international

[2] Morton Kaplan, *System and Process in International Politics* (New York: John Wiley & Sons, 1957).

conflict is reduced.[3] When placed in the context of major cataclysmic war, this assertion is in direct contradiction to the hegemonic theory which argues that peace is the result of the influence of a powerful, dominant state. To hegemonic theorists, a peaceful system is a system containing a preponderant power, and is therefore unbalanced.[4]

Some theorists view the level of uncertainty regarding aggression by potential adversaries as the underlying element driving the balance-of-power or the preponderance-of-power arguments.[5] The focus on uncertainty is also the central concern of those who believe that either bipolarity or multipolarity is the structure most conducive to peace. Polarity theorists seem to agree that multipolar systems inherently engender more uncertainty than do bipolar systems, but they disagree about how national leaders react to that uncertainty. Some believe that uncertainty stimulates particularly cautious behavior.[6] They hypothesize that such cautious behavior among decision makers reduces the likelihood that any nation will engage in activities that carry sufficient risk of precipitating a conflict.

Still others, believing that national leaders faced with uncertainty are more likely to miscalculate or misjudge their opportunities, argue that the uncertainty of multipolar systems leads nations to engage in highly dangerous activities.[7] This view can be interpreted as a belief that the miscalculations of national leaders lead to acts that are consistent with risk-acceptant behavior. Thus, decision makers in a multipolar world act *as if* they are risk-acceptant, thereby initiating or precipitating higher levels of conflict than would occur in a bipolar environment. Another interpretation of the handling of uncertainty by polarity theorists is that they assume that miscalculations are not symmetrically distributed

[3] Edward V. Gulick, *Europe's Classical Balance of Power* (Ithaca, NY: Cornell University Press, 1955); Hans Morgenthau, *Politics Among Nations* (New York: Alfred Knopf, 1978).

[4] A.F.K. Organski, *World Politics* (New York: Alfred Knopf, 1968); George Modelski, *Principles of World Politics* (Englewood Cliffs, NJ: Prentice-Hall, 1972); A.F.K. Organski and Jacek Kugler, *The War Ledger* (Chicago: University of Chicago Press, 1980); Robert Gilpin, *War and Change in International Politics* (New York: Cambridge University Press, 1981).

[5] J. David Singer, Stuart Bremer, and John Stuckey, "Capability Distribution, Uncertainty, and Major Power War, 1820-1965," in Bruce Russett, ed., *Peace, War, and Numbers* (Beverly Hills, CA: Sage Publications, 1972), 19-48.

[6] Karl W. Deutsch and J. David Singer, "Multipolar Power Systems and International Stability," *World Politics* 16 (April 1964), 390-406.

[7] Kenneth Waltz, *Theory of International Politics* (Reading, MA: Addison-Wesley, 1979), and Waltz, "The Stability of a Bipolar World," *Daedalus* 93 (No. 3, 1964), 881-909. We should note that Waltz uses bipolarity to refer to a situation in which most power is held by only two states that form the core of competing coalitions; others refer to bipolarity in terms of the number of discrete international coalitions. For Waltz, only the post-1945 world satisfies the definition of bipolarity—at least since the Napoleonic Wars. Our investigation of the effects of polarity on war is more in line with Kaplan's (fn. 2) and Deutsch and Singer's (fn. 6) usage of the concept of polarity.

around the "correct calculation." In other words, errors in multipolar systems tend to be generated in such a way as to bias decisions toward dangerous outcomes.

Related to the clustering of nations into poles is a concern with the *cohesiveness* of those poles. Generally stated, the view held by many theorists is that the more closely knit (or tighter) the bonds joining nations together within a pole, the lower the level of uncertainty about the reliability of one's allies and the opposition of one's foes. This increased tightness might make war more likely by providing information about the level of threat attributed to potential rivals and by making clear the magnitude of preparation necessary for a successful campaign. Conversely, others argue that the clarity provided by a high level of tightness reveals the risks associated with engaging in conflictual behavior, and thereby lowers the possibility of national leaders' miscalculating or misjudging their options—and waging war.[8]

To summarize, the following are the main hypotheses found in the literature linking system-level features to the probability of international conflict:

H1: A balance-of-power system tends to be peaceful and an imbalanced system tends to be conflictual.
H2: An imbalanced system tends to be peaceful and a balanced system tends to be conflictual.
H3: Bipolar systems tend to be peaceful and multipolar systems tend to be conflictual.
H4: Multipolar systems tend to be peaceful and bipolar systems tend to be conflictual.
H5: Systems with tight poles tend to be peaceful and systems with loose poles tend to be conflictual.
H6: Systems with loose poles tend to be peaceful and systems with tight poles tend to be conflictual.

Although we have greatly simplified the reasoning behind these six hypotheses, they represent the principal unidimensional perspectives in the literature connecting system structure to conflict. We will investigate the independent and the combined properties implied by these hypotheses.

In recent years, aspects of these perspectives have been tested; several excellent summaries of the evidence suggest that the hypotheses do not hold up well against variations in the specification of the relevant varia-

[8] Raymond Aron, *Peace and War*, trans. by Richard Howard and Annette Baker Fox (New York: Praeger, 1968); Kaplan (fn. 2); Bruce Bueno de Mesquita, "Systemic Polarization and the Occurrence and Duration of War," *Journal of Conflict Resolution* 22 (June 1978), 241-66.

bles.[9] Positive results appear to be highly data-dependent, and the general tendency of the analyses is to disconfirm all six hypotheses. Still these arguments should not be abandoned prematurely; perhaps the theories have not been more strongly supported because previous tests have seriously misspecified them.

Many of the system theorists are concerned with the interplay of several structural characteristics of the international system. They rarely isolate a single structural variable as the sole, or even the predominant, explanation of war or instability. The impact of polarity on peace, for instance, may be influenced by the tightness of the poles, and/or the distribution of power among the key states. Since many theorists recognize that it is unlikely that any one of the structural variables is, by itself, a satisfactory predictor of international conflict, it is inappropriate to evaluate the theories empirically without controlling for the effects of the other variables. We have therefore designed tests that account simultaneously for the three dimensions of polarity, tightness, and distribution of power.[10]

Specification of the Models

The central variable in theories of hegemonic stability (or power transition) and balance of power is the assessment of the distribution of power. For theories of polarity, the central variable is whether there are two or more than two poles. Finally, scholars concerned with the reliability of members of one or another pole focus on the tightness or looseness of the bonds within the poles.

The three dimensions specified in the systemic theories imply the eight possible types of systems depicted in Figure 1. Each dimension of the cube depicts one of the core systemic properties we address. Each face of the cube represents the combination of any two of these properties, holding the third constant. The front lower left-hand corner of the cube, for instance, depicts a situation of a tight, balanced, bipolar system. The rear upper right-hand corner depicts a loose, preponderant, multipolar system. All possible types of systems that can be generated using the three systemic attributes are accounted for in Figure 1. The eight generic international systems are:

[9] Siverson and Sullivan (fn. 1); Bruce Russett and Harvey Starr, *World Politics: The Menu for Choice*, 2d ed. (San Francisco: W. H. Freeman, 1985); Dina Zinnes, "Why War? Evidence on the Outbreak of International Conflict," in Ted Robert Gurr, ed., *The Handbook of Political Conflict* (New York: Free Press, 1980); William Wohlforth, "The Perception of Power: Russia in the Pre-1914 Balance," *World Politics* 39 (April 1987), 353-81.

[10] Kaplan (fn. 2); Aron (fn. 8); Waltz (fn. 7, 1979).

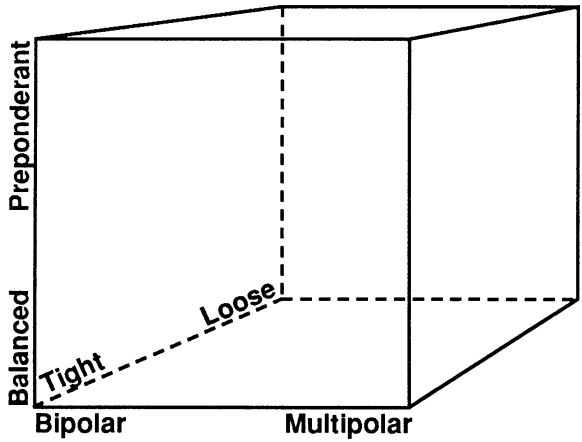

FIGURE 1
TYPE OF SYSTEM ACCORDING TO THREE STRUCTURAL DIMENSIONS

1. Tight, balanced, bipolar
2. Tight, balanced, multipolar
3. Tight, preponderant, bipolar
4. Tight, preponderant, multipolar
5. Loose, balanced, bipolar
6. Loose, balanced, multipolar
7. Loose, preponderant, bipolar
8. Loose, preponderant, multipolar.

In contrast to previous empirical studies, we examine the possible simultaneous contributions of all three theoretically identified features of the system. The analytic focus here is on the relationship between these system structures and the likelihood of various types of conflict.

Some theorists focus exclusively on wars among great powers,[11] while others are concerned with a broader set of wars.[12] We attempt to take both perspectives into account. However, we should be aware that, until after the fact, it is difficult to say which wars will threaten the structural fabric of the international system; it is therefore inappropriate to use *ex post* knowledge in a predictive model. The outbreak of war, however minor, holds the potential of escalating to global proportions. In this regard, we should remember that many did not expect Austria-Hungary's ultimatum to Serbia in 1914 to lead to a war involving all the great powers of the world.[13] Similarly, no one could be sure that the involvement

[11] Modelski (fn. 4); Waltz (fn. 7, 1964 and 1979); Organski and Kugler (fn. 4); Gilpin (fn. 4).
[12] Morgenthau (fn. 3); Singer, Bremer, and Stuckey (fn. 5); and Bueno de Mesquita (fn. 8).
[13] John Stoessinger, *Why Nations Go to War* (New York: St. Martins, 1974).

of the United States in Vietnam might not grow into a major confrontation between the Soviet Union, China, and the United States. Therefore, our empirical investigation encompasses two sets of analyses. The first, which occupies most of our attention, focuses on all wars involving at least one major power in Europe since the Congress of Vienna. The second, in keeping with the concern of preponderance theorists, stresses wars involving at least one great power on each side.

For each year between 1816 and 1965, we examine whether or not war began in Europe as a function of the number of poles, the tightness of the poles, and the distribution of power apparent in the system. Our inquiry is analogous to assigning the international system in each year to a position within the cube depicted in Figure 1 and evaluating the relationship between that location and the occurrence of international conflict. Following the intent of the system-level theorists, we confine our analysis to conflicts among major powers. In order to evaluate the effects of system structures comprising more than a single attribute, we specify the following statistical models:

$$(1)\ \text{Conflict} = a + b_1\ \text{Tightness} + b_2\ \text{Polarity} + b_3\ \text{Balance}$$

$$(2)\ \text{Conflict} = a + b_1\ (\text{Tightness})(\text{Polarity})(\text{Balance})$$

$$(3)\ \text{Conflict} = a + b_1\ \text{Tightness} + b_2\ \text{Polarity} + b_3\ \text{Balance} + b_4\ (\text{Tightness})(\text{Polarity})(\text{Balance}) + b_5\ (\text{Tightness})(\text{Polarity}) + b_6\ (\text{Tightness})(\text{Balance}) + b_7\ (\text{Polarity})(\text{Balance})$$

Equation (1) assesses the independent effects of each of the dimensions of the cube of Figure 1. This equation controls for the independent effects of each of the major ways of describing the international system. The linear, additive model of equation (1) represents our most elementary response to our own criticism that earlier empirical studies addressed only one structural argument at a time. In equation (2), we provide a simple model that combines interactively the three attributes of polarity, power balance, and tightness. In equation (3), we account for the independent as well as the interactive effects of the three dimensions. This last equation contains the most complete specification; it identifies the relationship between the location of an international system in the cube of Figure 1 and the observation of war.

Measurement

Two data sets are used for our analyses. In one, the unit of analysis is the year; in the other, the unit of analysis is the conflictual event itself.

In the first data set, the dependent variable WAR indicates whether or not a European war involving at least one major power began in the year of the observation. If such a conflict began in that year, the variable is coded one; if not, it is coded zero. The determination of the presence of such a conflict is based on Singer and Small's definitions of war and of major-power status. The second data set consists of 125 observations for which we have complete data; 97 of these designate international disputes that did not become wars, while the remaining 28 satisfied the criteria for an interstate war as specified by Singer and Small. This data set is derived from earlier research by Gochman. The variable WAR is coded one in the events data set if the conflict under examination satisfies the definition of a war. Otherwise, WAR is coded zero. We make a further distinction between wars involving great powers on each side (MPWAR = 1) and those in which only one of the initial belligerents was a major power (MPWAR = 0). Major powers are defined in accordance with Singer and Small.[14]

The independent variables are all operationalized in accordance with procedures used by ourselves or others in previous studies. The balance or imbalance of power, for instance, is measured as the concentration of power, using the composite capabilities index developed by the Correlates of War project. The concentration of power is estimated using procedures developed by others in earlier research.[15] We depart from the measure of concentration used in prior studies only in that we base our calculations on annual, rather than quinquennial, composite capabilities data. The measure is calculated across the major powers, which we specify slightly differently from Singer and Small: because our tests are focused on conflict in Europe, we include only European major powers in our calculations. The United States is included as a European major power after 1939, when it chose to play an active diplomatic, strategic, and military role in European affairs. The higher the concentration score, the more preponderant (and consequently less balanced) is the distribution of power in the European major-power system for that year.

Whether the European major-power system was bipolar or not is determined using the procedure developed by Bueno de Mesquita. Since that procedure is discussed in detail elsewhere and has been used in sev-

[14] J. David Singer and Melvin Small, *The Wages of War* (New York: John Wiley & Sons, 1972); Charles Gochman, "Status, Conflict, and War: The Major Powers, 1820-1970," unpub. Ph.D. diss. (Ann Arbor: University of Michigan, 1975).

[15] Singer, Bremer and Stuckey (fn. 5). See also James Ray and J. David Singer, "Measuring the Concentration of Power in the International System," *Sociological Methods and Research* 1 (May 1973), 403-36.

eral subsequently published studies, we do not review the technique extensively here.[16] The purpose of this technique is to cluster European nations according to the similarity of their portfolios of alliances. We slightly modify the original technique by noting that any nation whose highest dyadic alliance similarity score is less than zero is in fact always nonaligned, and is therefore treated as a pole unto itself. For the purpose of evaluating the number of poles, only the major powers are counted, although their alliance behavior takes their linkages to any and all other states in Europe into account.

The measurement of the tightness or looseness of poles is based on the degree of similarity of alliance portfolios across nations, as has been described in detail elsewhere.[17] This measurement technique has been used in several studies to assess the cohesion of international blocs or the cohesiveness of individual dyads.[18] For each year, the degree of tightness found in the international system is assessed according to the similarity of formal alliance commitments across every pair of nations in the European system. The calculation of systemic tightness is accomplished by using the Tau_b statistical measure to indicate the dyadic similarity of national foreign policies. Typal analysis is applied to the Tau_b scores to identify the clustering of nations into blocs or poles. Finally, the mean of all intra-bloc Tau_b values yields the measure of systemic tightness.

Results of Systemic Level Tests

Since both data sets account for international conflict as either present or absent, the war variable for the statistical models specified in equations (1), (2), and (3) is dichotomous. Due to the discreteness of the dependent variable, these equations fail to meet the usual requirements for estima-

[16] Bueno de Mesquita, "Measuring Systemic Polarity," *Journal of Conflict Resolution* 19 (June 1975), 77-96; Bueno de Mesquita, (fn. 8); Bueno de Mesquita, *The War Trap* (New Haven: Yale University Press, 1981); Charles Ostrom, Jr., and John Aldrich, "The Relationship between Size and Stability in the Major Power International System," *American Journal of Political Science* 22 (November 1978), 743-71; Frank Wayman, "Bipolarity and War: The Role of Capability Concentration and Alliance Patterns among Major Powers, 1816-1965," *Journal of Peace Research* 21 (No. 1, 1984), 61-78.

[17] Bueno de Mesquita (fn. 16).

[18] Bueno de Mesquita (fn. 8 and fn. 16); Michael Altfeld and Bueno de Mesquita, "Choosing Sides in Wars," *International Studies Quarterly* 23 (March 1979), 87-112; Organski and Kugler (fn. 4); Jacek Kugler, "Terror without Deterrence," *Journal of Conflict Resolution* 28 (September 1984), 470-506; Jacek Kugler, "The Politics of Foreign Debt in Latin America: A Study of the Debtors' Cartel," *International Interactions* 13 (No. 2, 1987), 115-44; Walter Petersen, "Deterrence and Compellence: A Critical Assessment of Conventional Wisdom," *International Studies Quarterly* 30 (September 1986), 269-94; Bruce Berkowitz, "Realignment in International Treaty Organizations," *International Studies Quarterly* 27 (March 1983), 77-96; Michael Altfeld and Won Paik, "Realignment in ITOs: A Closer Look," *International Studies Quarterly* 30 (March 1986), 107-14.

tion by the method of ordinary least squares. To evaluate the effect of the independent variables on the probability of observing a violent conflict, we arrive at our estimation of the parameters in equations (1), (2), and (3) through probit analysis.

One of our major goals is to investigate the empirical support for systemic explanations of international conflict; it is desirable that we be able to distinguish the effects of the separate systemic variables. This effort would be frustrated in a multivariate framework if the independent variables themselves were highly correlated. The correlations between tightness, polarity, and the distribution of power are presented in Table 1. It is evident from the low correlations between these variables that problems with multicolinearity do not prohibit an evaluation of the separate effects these features of the international system have on the occurrence of war. It is also evident that the degree of colinearity is not highly variable across these two data sets.

TABLE 1
BIVARIATE CORRELATIONS AMONG THE INDEPENDENT VARIABLES

	By Event (N = 125)			*By Year (N = 140)*		
	Tightness	*Balance*	*Polarity*	*Tightness*	*Balance*	*Polarity*
Tightness	1.000	0.413	0.041	1.000	0.412	−0.039
Balance		1.000	−0.064		1.000	0.098
Polarity			1.000			1.000

The maximum likelihood estimates of the parameters for models (1), (2), and (3) based on the events data are given in Table 2, together with their confidence levels.

The tightness variable appears to be positively and significantly related to war when specified according to model (1), using WAR as the dependent variable. When tightness is put in the form of an interactive variable together with the variables Balance and Polarity, there is little confidence in the predictive quality of the relationship. Also, when systemic tightness is specified as part of model (3), tightness is no longer a significant predictor.

Aside from the performance of tightness in model (1), there are no statistically significant variables indicated in Table 2. As predictive equations, the models fare poorly. Models (1) and (2) are unable to improve upon the explanatory power obtained by always predicting that an event will be in the modal category of non-war, as indicated by the proportionate reduction in error (P.R.E.) of 0.0.

TABLE 2[a]
SYSTEM STRUCTURE AND THE LIKELIHOOD OF WAR BY EVENT

	Model 1		*Model 2*		*Model 3*	
	Coefficient	*P>t*	*Coefficient*	*P>t*	*Coefficient*	*P>t*
α	−2.676	.000	−.809	.000	−3.446	.401
Tightness (T)	2.338	.000			.120	.983
Polarity (P)	.060	.843			36.724	.167
Balance (B)	.749	.764			4.238	.769
TxPxB			.925	.433	192.602	.205
TxP					−40.377	.228
TxB					6.414	.748
PxB					−173.305	.163
Model X^2	21.34		.61		31.19	
p of X^2	.0001		.436		.0001	
P.R.E.	0.0		0.0		.107	
N = 125						

[a] We conducted a number of additional tests that are not reported in detail here in order to conserve space. We investigated variations of models (1), (2), and (3) in which the independent variables were lagged; were constructed as first differences over various time intervals; and in which various nonlinear forms were used. These all yielded results comparable to those reported in Tables 2, 3, and 4. We also tested an alternative conceptualization of polarity by designating the post-1945 years as bipolar and all other years as multipolar (Waltz, fn. 7, 1964, 1979). These additional tests did not produce significant relationships or improve the ability to predict events.

Model (3), which we believe to be the most accurate statistical evaluation to date of the controversies regarding systemic structure, yields a proportionate reduction in error of only 10.7 percent. The predictions even from this model are quite similar to predicting the modal category. Of the 97 events that did not escalate to war, 94 are accurately predicted—but at the cost of erroneously predicting that 22 of the 28 war events would not reach that level.

Table 3, which presents the analysis of models (1), (2), and (3) using the data organized by year, yields results that reinforce the conclusions from Table 2.[19] Examining the effects of system structure on the likelihood of war year by year, we find that not even one variable achieves statistical significance. This holds true whether the dependent variable evaluates war in general or focuses only on wars between major powers. The "goodness of fit" is so weak that not one of the models, whether based on WAR or MPWAR as the dependent variable, yields any reduction in error over the naive predictions based on the modal category.

[19] Model 3 can not be calculated with MPWAR as the dependent variable. With only 6 years in which major power wars began (out of the 140 years for which we have complete data), the independent variables outnumber the observations. Models 1 and 2 have been estimated.

TABLE 3
SYSTEM STRUCTURE AND THE LIKELIHOOD OF WAR BY YEAR

	Model 1		*Model 2*		*Model 3*	
	Coefficient	*P>t*	*Coefficient*	*P>t*	*Coefficient*	*P>t*
α	−1.748	.006	−1.130	.000	−4.433	.165
Tightness (T)	.871	.136			.143	.972
Polarity (P)	−.035	.900			4.613	.146
Balance (B)	−.108	.960			10.434	.352
TxPxB			−.459	.689	8.181	.659
TxP					−.490	.908
TxB					.908	.949
PxB					−21.722	.139
Model X^2	2.76		0.16		15.63	
p of X^2	.431		.686		.029	
P.R.E.	0		0		0	
N = 140						

Figure 1 and the findings from its associated empirical analyses reported in Tables 2 and 3 are of greatest interest to theorists who concentrate their efforts on explanations of conflict at the system level. We recognize, of course, that the relationships may be more complex than the statistical models we have constructed. Without more specific theoretical guidance, consistent empirical results will probably continue to be elusive in the field of international relations. We maintain, however, that system theorists have been clear on the importance of the three dimensions used to construct Figure 1. Our tests that include the interactive as well as the separate effects of polarity, tightness, and balance reinforce the evidence from earlier investigations that focused on only one structural dimension at a time. These structural dimensions, contrary to arguments in the literature and to conventional wisdom, show no sign of significantly altering the likelihood of international warfare.

INDIVIDUAL LEVEL ANALYSIS AND THE DYAD

Some analysts have pursued theory building at the individual state level in order to develop the reasoning that underlies the behavior of the international dyad. Because of the great complexity of relationships in any fairly large system, it is all too possible that individual behaviors can cancel one another out, and thus mask an understanding of actual relationships. Beyond this academic concern, there is a policy-relevant aspect to microlevel theories. Decision makers are responsible for formulating

policy in the interest of their nation. They are not expected to design policies that redound to the benefit of the greater community of nations if such policies would harm the interests of their own state. A policy maker who is faced with a choice between a policy that leads to an international system that is thought to be conducive to peace and a policy that provides security for the individual state, would, at the very least, confront an ethical dilemma. It is also quite plausible that decision makers in this position would wish to be highly confident of the effects of any decision before overriding the responsibilities with which they have been charged. As academicians, we are not faced with such problems. Still, it is our responsibility to provide the most reliable explanations within our ability. We share the view expressed by Siverson and Sullivan that the reliability of explanations of international phenomena will be improved by wedding systemic and dyadic (individual) level approaches.[20] Indeed, we believe that the international system is itself the aggregate manifestation of individual actions based on individual incentives. If this view is correct, reliable explanations of systemic phenomena should result from the logic of individual behaviors.

In order to address the question of what might motivate warlike behavior among individual decision makers, we must explicitly set out our assumptions from which we derive hypotheses that can be compared to the current system-level explanations.

Assume that decision makers act in what they believe to be the best interest of their state, and thus behave as expected utility maximizers. Assume, then, that decision makers subjectively assess the expected gains and losses from either challenging or not challenging some potential adversary. We construct a predictive model based on these assumptions, with the additional qualification that the probability that a national leader will choose to use force against an adversary increases in a strictly monotonic fashion with our estimates of expected utilities from challenging versus not challenging the opponent. From these basic assumptions, we derive the relative probability for various forms of international violence between two states that find themselves in a confrontational situation.

By a threatening or confrontational situation we mean an international crisis. Following Lalman, we define a crisis as a constraint on the strategies that are open to a decision maker. In the absence of a crisis, an individual actor or nation has a basic set of strategies available:

1. to do nothing, allowing the potential antagonist the option of initiating any action;

[20] Siverson and Sullivan (fn. 1).

2. to make a demand upon the other actor, accompanied by some incentive to yield concessions;
3. to resort to force in order to extract the improvement in welfare that the initiator wishes to obtain.

A crisis situation is defined as a condition where the "do-nothing" strategy is not feasible. Since at least one of the parties will no longer accept the current configuration of policies, some new arrangement must be found. Without the discovery of some mutually acceptable negotiation point, the crisis condition will precipitate some form of violent event.[21]

The conjunction of choices to use force (strategy 3) or not to use force (strategy 2) by two contending states, i and j, yields four possible events that can arise from the dispute: war, a military intervention by i, a military intervention by j, and the peaceful resolution of the dispute. We calculate the *ex ante* probability that a conflict of interest between nation i and nation j will be resolved in one of these four identified forms as follows:

(a) $P(\text{War}) = P_{F_i}(P_{F_j})$
(b) $P(\text{Intervention by } i) = P_{F_i}(1 - P_{F_j})$
(c) $P(\text{Intervention by } j) = (1 - P_{F_i})P_{F_j}$
(d) $P(\text{Peaceful Resolution}) = (1 - P_{F_i})(1 - P_{F_j})$

where P_{F_i} is the probability that i chooses its fight strategy and P_{F_j} is the probability that j chooses its fight strategy. A fifth important condition is defined by combining all violent outcomes. The probability of some form of violence resulting from the crisis is the sum of the probabilities in (a) to (c):

$$\begin{aligned}(e)\ P(\text{Violence}) &= P(\text{War}) + P(\text{Intervention by } i) \\ &\quad + P(\text{Intervention by } j) \\ &= 1 - P(\text{Peaceful Resolution}).\end{aligned}$$

Although all these functional forms are of great importance to the study of international conflict, we restrict our attention in this paper to the probability of war. The interpretation of the equation predicting the condition of war is that the probability of war is the product of the probability that i escalates its threat against j to the point of force, and the probability that j also escalates to the use of force against i. As mentioned previously, the probabilities attached to the strategy choices are assumed to be strict monotonic functions of the utility that an actor expects to gain from challenging another state. Thus, condition (a) converts to probabilistic terms Geoffrey Blainey's categorical observation that "wars can

[21] David Lalman, "Conflict Resolution and Peace," *American Journal of Political Science* 32 (August 1988), forthcoming.

only occur when two nations decide that they can gain more by fighting than by negotiating."[22] Even though condition (a) is a dyadic, theoretical statement, it does not rule out the possibility of systemic influences on the occurrence of war. The policies held by states, the distribution of power in the international system, and the possibilities for power to be aggregated through alliances are all systemic attributes that affect a decision maker's assessment of what is to be gained through challenging another state and the probability that it actually would be gained. In this way, our approach substantially accomplishes the objective of combining systemic and dyadic factors in analyzing conflict.

Operational Procedures

We assume that the selection of a strategy either to negotiate with or to fight another nation is consistent with the net gains that are expected to result from challenging that nation. In order to evaluate empirically the proposition that war is the product of individual strategic choices, we assume that these decisions are based on the policy positions taken by states and the power they may exercise in the pursuit of their interests. We describe only the main features of the estimation procedure here and refer the reader to other studies for more detailed descriptions.[23]

Prior to the onset of a crisis, nation i is faced with the choice between challenging some nation j with the intention of persuading j to alter its foreign policies in keeping with the policies preferred by i, or not challenging j's policies; the latter would leave j free to formulate policy in the absence of explicit pressure from i. If i chooses to forgo challenging j, then i contemplates the prospects and the probabilities of three contingencies: that j's policies will not be changed over the period of concern to i, that j's policies will improve from i's perspective, or that j's policies will deteriorate. Nation i anticipates that, with some probability (Q), j will not alter its current policies over the time period of concern to i, and i will continue to derive the utility that it associates with the status quo between itself and j, denoted ($U^i sq$). On the other hand, i may anticipate that, for better or for worse, j's foreign policies will undergo some change. If j does reformulate its policies, i expects with probability (T) that the change will be in a direction that is better for i, and with probability ($1 - T$) the change will be detrimental to the interests of i. We

[22] Blainey, *The Causes of War* (New York: Free Press, 1973), 159.

[23] Bueno de Mesquita, "The War Trap Revisited," *American Political Science Review* 79 (March 1985), 157-76.; Bueno de Mesquita (fn. 16); Bueno de Mesquita and Lalman, "Reason and War," *American Political Science Review* 80 (December 1986), 1113-31; Lalman (fn. 21).

denote the expected utility of a change for the better from the standpoint of i's interests as $T(U^i_{bi})$, and the expected utility of change for the worse as $(1-T)(U^i_{wi})$.

The alternative strategy to not challenging j is that i chooses to pressure j for a modification of policies in line with i's interests. With probability $(1-S_j)$, j may yield to the demands without the use of force by i. Recognizing that j may also resist i's demands with probability (S_j), i must be prepared to compel j to alter its policies. Should i and j both press the issue to the point of an open military confrontation, then i estimates its chances for successfully winning control of j's policies (valued at U^i_{si}) as the probability (P^i_i). In this contest, i is also aware of the prospects for failure $(1-P^i_i)$ and the loss of control over its own foreign policy (U^i_{fi}).

The difference in net utility that i expects between challenging and not challenging is calculated as follows:

$$E^i(U_{ij}) = E^i(U_{ij})c - E^i(U_{ij})nc,$$

where the expected utility of challenging nation j is

$$E^i(U_{ij})c = S_j[P^i_i(U^i_{si}) + (1-P^i_i)(U^i_{fi})] + (1-S_j)(U^i_{si}),$$

and the expected utility of not challenging j equals

$$E^i(U_{ij})nc = Q(U^i_{sq}) + (1-Q)[T(U^i_{bi}) + (1-T)(U^i_{wi})].$$

A foreign policy position adopted by a nation is assessed according to the array of formal defense commitments it has undertaken. The utility terms associated with these positions are measured as a function of the similarities in international accords.[24] The utilities associated with success, failure, and the status quo are estimated according to the method described in "The War Trap Revisited."[25] The utilities for the possible changes in j's policies where there is no challenge from i are estimated by the procedure described in "Reason and War."[26] The welfare that is to be gained or lost by a nation is in the form of a change in the configuration of another state's foreign policies from the status quo. When two nations hold similar foreign policies, there is little to be gained by one's challenging the other. Conversely, greatly dissimilar policies provide an incentive, though not necessarily the requisite capability, to challenge those policies. The combination of both the incentive for a change and

[24] Melvin Small and J. David Singer, "Formal Alliances, 1816-1965: An Extension of the Basic Data," *Journal of Peace Research* 6 (No. 3, 1969), 257-82.

[25] Bueno de Mesquita (fn. 23).

[26] Bueno de Mesquita and Lalman (fn. 23).

the capability to achieve that change forms the basis for a decision maker's expectation of a gain in its welfare.

The assessment of national power (or capability) for each nation in the system is calculated as the annual composite capability index developed by the Correlates of War project. This index measures the military, industrial, and demographic capabilities of a nation relative to the capabilities in the system. The term for the probability of success (P^i_i) is estimated as the proportion of national capabilities available to i relative to all the capabilities that i expects to be involved in the dispute. We assume that both antagonists i and j are willing to contribute all of their capabilities in order to succeed in the dispute. Third parties, who may not be belligerents and therefore are not necessarily risking the control of their policies, are assumed to contribute their capabilities proportionate to their preference for a victory of i over j.[27] This procedure results in expected utility estimates that take on values from -3 to 3. In the statement of the theory, we postulated that the probability that an actor uses force is a monotonic function of our estimate of its expected utility for challenging the other state. Whatever function is selected, it must map the expected utility values into the [0,1] interval for probabilities. Here we employ linear functions that are identical for both i and j[28]:

$$P_{F_i} = [3 + E^i(U_{ij})]/6,$$
$$P_{F_j} = [3 + E^j(U_{ji})]/6.$$

Once these two values are estimated following the method we have outlined, we can substitute them directly into the equations for conditions (a) through (d) to derive our predictions. Here we do so only for condition (a), defining a variable we call P(War).[29]

Empirical Analysis

Our interest here is in juxtaposing the individual-level and the system-level approaches. The function estimating the probability of war is used

[27] Altfeld and Bueno de Mesquita (fn. 18). For a full description of the estimation of the probability of success, see Bueno de Mesquita and Lalman (fn. 23).

[28] Results from these linear transformations are reported in Bueno de Mesquita and Lalman (fn. 23). Lalman (fn. 21) reports results from various curvilinear functions and finds that these functions do not perform in significantly different ways from linear models. These studies yield strong empirical support for our contention that such functions reliably estimate the probability of war and other forms of violence.

[29] To check for possible problems with multicolinearity, we correlated P(War) with the other independent variables: Tightness, Balance, and Polarity. The respective correlations are .199, .114, and $-.344$.

to capture the calculations of national leaders confronting one another in a crisis. Beyond the concern of these leaders for the welfare of their states, it is entirely possible that decision makers also assess the overall conditions of the international system when deciding upon a course of action. Systemic attributes may represent either constraints on their decisions or opportunities for their activities. In order to capture the impact of such potential systemic constraints, we construct tests that are parallel to those presented in Table 2 by adding to those models the variable *P*(War).[30] The results of these statistical estimations are presented in Table 4.

TABLE 4[a]
SYSTEM STRUCTURE, INDIVIDUAL INCENTIVES, AND THE LIKELIHOOD OF WAR

	Model 1		*Model 2*		*Model 3*	
	Coefficient	*P>t*	*Coefficient*	*P>t*	*Coefficient*	*P>t*
α	−3.998	.000	−2.886	.000	−5.484	.215
P(War)	6.702	.001	8.001	.000	8.902	.001
Tightness (T)	1.909	.002			−.691	.911
Polarity (P)	.473	.157			38.892	.144
Balance (B)	.310	.910			5.234	.732
TxPxB			2.625	.051	198.832	.191
TxP					−40.216	.229
TxB					6.293	.765
PxB					−185.083	.137
Model X^2	33.53		21.70		46.61	
p of X^2	.0000		.0000		.0000	
P.R.E.	.214		.179		.321	
N = 125						

[a] In addition to the lags, first differences, and nonlinear tests mentioned in the footnote to Table 2, we also replicated models (1), (2), and (3) with *P*(War) treated interactively with the structural variables. Again, no marginal gain in predictive or explanatory power was achieved over the simple treatment of *P*(War) as a separate, additive variable.

These analyses largely reinforce the results from Table 2. The individual-level variable *P*(War) is statistically significant in all three models. In the test of model (3) — the most comprehensive test — it is the only significant variable. Indeed, *P*(War) is the only variable in all of the analyses that is consistently significant.

[30] Comparable analyses cannot be conducted using the data set organized by years because *P*(War) is a dyadic, not a systemic, attribute; it is therefore undefined for the system as a whole.

Conclusion

We set out to tie individual-level incentives and structural constraints in order to obtain a better understanding of the factors that affect the likelihood of war. Earlier tests of structural explanations seemed disappointing. However, we believed that the lack of consistent evidence regarding system structure and war might be a consequence of misspecified statistical models rather than a problem in the theories themselves. We believe that our tests do a better job of representing the intentions of system theorists who emphasize the interplay of the distribution of power, the number of poles, and the tightness of the poles in predicting the occurrence of major-power wars. Nonetheless, our test results are consistent with earlier findings. We continue to find encouraging results in the individual-level perspective, but have discovered no evidence that decision makers act as if they were significantly constrained by variations in the structural attributes we examine. It may be that decision makers have already taken those structural attributes into account, or that we have failed to specify models that fully capture the intentions of one or another theorist. We hope that such theorists will help to inform future empirical investigations by specifying clearly and precisely what tests of their propositions are most appropriate. It is of equal importance that empirical analysts do justice to those specifications.