

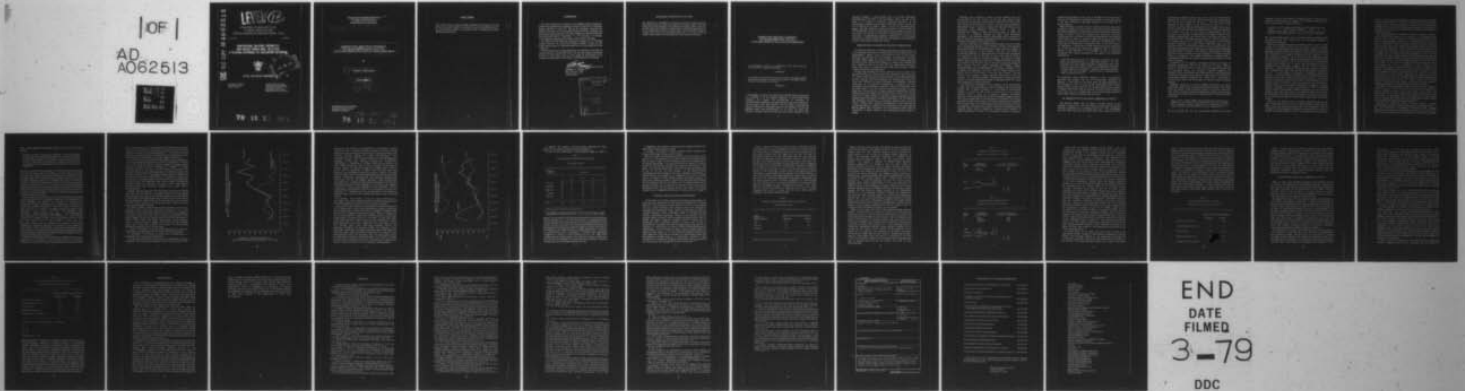
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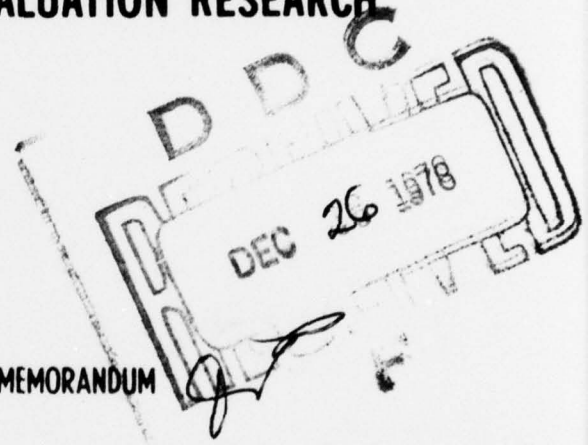
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STRATEGIC STUDIES INSTITUTE  
US ARMY WAR COLLEGE  
CARLISLE BARRACKS, PENNSYLVANIA 17013

20 JUNE 1978

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**ARBITRATION, MILITARY CAPABILITY,  
AND MAJOR POWER WAR, 1815-1914:  
A SYSTEMS APPROACH TO EVALUATION RESEARCH**



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9 military issues research memo.

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ARBITRATION, MILITARY CAPABILITY,  
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by

10 Gregory A. Raymond

11 20 June 1978

12 37p.

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## FOREWORD

This memorandum was presented at the Military Policy Evaluation: Quantitative Applications workshop conference hosted by the Strategic Studies Institute in mid-1977. During the workshop, sponsored by DePaul University and the Strategic Studies Institute, academic and government experts presented the latest findings of formal models and statistical-mathematical approaches to the processes of military decisionmaking, assistance, intervention, and conflict resolution.

The Military Issues Research Memoranda program of the Strategic Studies Institute, US Army War College, provides a forum for the timely dissemination of analytical papers such as those presented at the workshop.

This memorandum is being published as a contribution to the field of national security research and study. The data and opinions presented are those of the author and in no way imply the indorsement of the College, the Department of the Army or the Department of Defense.



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## BIOGRAPHICAL SKETCH OF THE AUTHOR

DR. GREGORY A. RAYMOND is an assistant professor of political science at Boise State University, Idaho. He received his bachelor's degree from Park College, Kansas City, Missouri, and earned his master's degree and doctorate from the University of South Carolina. Dr. Raymond has co-edited *International Events and the Comparative Analysis of Foreign Policy* and written various articles on foreign policy matters for professional journals. He is currently conducting research on Spain and the second enlargement of the European Community.

**ARBITRATION, MILITARY CAPABILITY,  
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It is impossible to attack as a transgressor he who offers to lay his grievances before a tribunal of arbitration.

--Archidamus

An arbitrator who agrees with (at least) one party to the dispute will be useless. But an arbitrator who agrees with no party to the dispute will also be useless. So arbitrators are not useful.

--Chuang Tzu

Increasingly, in recent years, great stress has been placed on the need for evaluation to be an integral component of social amelioration programs. Yet, despite the proliferation of literature on conceptualizing, designing, and implementing social action evaluations, there has been very little spillover into the field of international relations. What all too frequently passes as an evaluation is, at best, an appraisal based upon impressionism, or, at worst, one laden with partisan overtones. While no doubt the former may provide us with

important insights, it could instead prove to be quite misleading, depending upon the skills of the investigator. Hence, the aim of this paper is to conduct a systematic, empirical evaluation of the consequences resulting from one type of interstate activity: namely, the use of arbitration to resolve conflict. As the two quotations above suggest, although arbitration has had a long history in both the Western and non-Western worlds, this vast legacy does not speak to us with one voice about the capacity of arbitration to settle disputes. However, by borrowing a methodological approach developed in social program evaluation, we shall be armed with the tools necessary for assessing the impact of international arbitration efforts.

### ARBITRATION AS A MODE OF CONFLICT RESOLUTION

*An Historical Overview.* According to Bozeman, the first known case of international arbitration occurred during the third millennium B.C. in Mesopotamia.<sup>1</sup> Lagash, Umma, and Kish were three of about fifteen politically autonomous but economically interdependent Sumerian city-states. When Lagash and Umma clashed over a boundary question, the King of Kish arbitrated the dispute in a manner that allegedly had been revealed to him by the God Enlil. By relying upon arbitration rather than force, the disputants had shown that interstate conflict could be resolved by peaceful means.

Though cases involving the use of arbitration can be found in the ancient Near East, its practice first became popular in the 7th century B.C. where it spread from the Greek city-states on the Balkan Peninsula to their colonies scattered throughout the Aegean and Ionian seas. These early arbitrations focused primarily on establishing a general framework for the political reconciliation of disputes, and only secondarily upon achieving a technically satisfactory liquidation of the immediate issue.<sup>2</sup> They were carried out among the members of a given league and, to a lesser extent, between opposing confederations. In each instance arbitrators usually were selected from the citizenry of a neutral *polis* but, at times, groups of city-states, league assemblies, and the Delphic Oracle functioned as *amiable compositeurs*. By the Hellenistic Age arbitration had become a commonly adopted mode of pacific redress. Treaties often included compromissory clauses binding the contracting parties to arbitrate future differences, and states such as Rhodes gained wide recognition for their arbitral skills. With the ascendancy of Rome, however, this longstanding pattern began to change.

Although some arbitrations during the *Pax Romana* did occur between Rome and other powers, in the main they centered upon controversies among states inside Rome's imperial orbit. Thus, rather than arbitration functioning as a conflict resolution procedure between independent states, it became a method by which the Senate (or its appointees) could adjudicate differences within a large and heterogeneous Empire. In short, arbitrations began to assume the character of a litigation. Whereas the earlier Greek arbitrations pertained to the interstate political relationship which surrounded a dispute, Roman jurisprudence engendered a trend toward dealing with the legal technicalities of the dispute itself.<sup>3</sup>

Interstate arbitrations in medieval Europe initially were very similar due to the political primacy of the arbitrator. Instead of the claimants being subordinated to the secular power of Rome, they were subject to the sacral authority of the Papacy.<sup>4</sup> But with the decline of ecclesiastical influence in tellurian matters, arbitral awards increasingly were decided by peers on the basis of equity rather than by virtue of the third-party's claim to universal supremacy. Throughout the High Middle Ages arbitrations of this sort transpired between the Italian city-states and, by the 15th century, they also took place among the Swiss cantons and the towns comprising the Hanseatic League. Notwithstanding this transformation, arbitrations continued to be "irregular and spasmodic" until the 1794 Jay Treaty between Great Britain and the United States: "from this time forward," observes Raiston, "they assumed a certain regularity and system."<sup>5</sup> Given the existence of a patterned regularity in arbitration following the 18th century, it therefore should be possible to generalize about the causes and consequences of arbitral activity.

*Some Theoretical Assumptions.* The orthodox view of world politics is based upon the twin pillars of state sovereignty and international anarchy. But, as Masters reminds us, "if we speak of international 'anarchy', it would be well to bear in mind that it is an 'ordered anarchy'."<sup>6</sup> That is, there are a number of regulator mechanisms operative in the international system which ostensibly mitigate conflict. One such instrumentality is the framework of collective expectations provided by legal norms. Kegley has found a marked shift in this global belief system away from norms associated with the acceptance of force as a legitimate means of national redress, and toward a steadily growing emphasis upon conflict management through pacific methods of dispute settlement.<sup>7</sup> In view of the importance attached to third-party

settlements throughout history and, in the light of the current stress laid upon achieving peace *via* amicable procedures, it seems appropriate to ask why arbitration is generally believed to be a viable way of preserving peace.

Many advocates of pacific methods of dispute settlement answer this question by arguing that states resort to war whenever misconceptions, wounded sensibilities, and aroused national passions obscure alternative modes of redress. From their vantage point, third-party arbitration could prevent the outbreak of war because dispassionate intermediaries would bring the facts of a dispute to light and propose an honorable means for mutual accommodation.<sup>8</sup> Moreover, the likelihood of war would also be reduced since the arbitrator offers a clear last chance to the disputants; "if agreement is badly desired and further negotiation out of the question, the arbitrator's suggestion may be accepted in default of any alternative."<sup>9</sup> As Randolph has put it, third-party procedures offer distinct advantages in each phase of the settlement negotiations.

In the initial phase, parties can more readily agree on the third party than decide all important aspects of negotiating positions . . . . In the intermediate phase, third parties can propose solutions which parties find acceptable but cannot advance because of disadvantages for partial interests in taking on a moderate position. In the final phase, third parties can expect support from the public . . . in behalf of enforcement solutions, a support less freely extended to parties because of association with conflict and partial interests.<sup>10</sup>

To summarize, then, arbitration appears to offer "a potentially powerful and flexible tool for the international settlement of disputes."<sup>11</sup> And while not all writers agree, the logical implication of this reasoning is that a strong inverse relationship exists between arbitral activity and the onset of war. Having outlined what is assumed to happen when states make the decision to arbitrate their differences, let us now turn to a consideration of the methodological approach which will be utilized to evaluate arbitral activity.

#### AN APPROACH TO EVALUATING ARBITRAL ACTIVITY

*The Research Model.* "On no subject of human interest, except theology," insists Gray, "has there been so much loose writing and nebulous speculation as on international law."<sup>12</sup> Not surprisingly, much the same has been said about other areas within the field of

international relations. Indeed, the current state of international relations theory is such that one observer recently commented that we still "do not know where we are today . . . and what little reliable feedback we have suggests we are not where we want to be."<sup>13</sup> In response to such gloomy pronouncements several authors have argued that the field is now entering a postbehavioral era. What this implies is not exactly clear. On the one hand, postbehavioralism has been described as a technique of philosophical investigation founded upon historicist epistemology, and, on the other, it has been portrayed as a problem-oriented focus upon substantive issues.<sup>14</sup> The crux of this *mot de l'enigme* seems to lie in divergent interpretations of the linkage between knowledge and action. Some individuals argue that the behavioral study of international relations has not uncovered any new nontrivial relationships; others state that we have generated knowledge but have failed to reemploy it; and finally, a third school of thought holds that we have misused our research findings.<sup>15</sup> Though each group differs in its diagnosis of the malaise afflicting the academic study of international relations, one common prescription has emerged—a strong dose of relevance.

Irrespective of the apparent convergence beneath the banner of relevance, disagreement still can be found over the query, "What is relevant?" Obviously there are various criteria for judging the relevance of a particular study; e.g., criticality, timeliness, targeting, and feasibility. Thus, rather than merely reflecting the perceived importance of the issue being researched, relevance frequently has been defined as anticipating potential problems and coping with a policymaker's resource needs. Seen from this perspective, relevant research is applied research.

Although references to the pure/applied dichotomy are replete throughout social science literature, several questions have been raised about the validity of this idealization. Brecht, for instance, points out that "theory, instead of being well-prepared in advance, is often rather clumsily being formed while we are going ahead."<sup>16</sup> Similarly, Kaplan asserts that

much of what is called 'applied' science can be seen as such only in a subsequent reconstruction: a theory is developed in the course of dealing with a problem of so-called 'application,' it is abstracted from such contexts, then afterwards referred back to them as 'applied science.'<sup>17</sup>

On the practical side, too, the pure/applied idealization has been

criticized. As Colin Gray observes, the scholar simply "cannot act as an academic problem-solving fire brigade."<sup>18</sup> To attempt anything of the sort, continues Eayrs, is simply unrealistic.

The history of recent international relations is strewn with the litter of the schemes of intellectuals-turned-policy makers, or of intellectuals-turned-policy advisers: schemes contrived in haste, put forward in conceit, and abandoned, as soon as may be decently possible.<sup>19</sup>

But, notwithstanding these criticisms, both pundits and foreign policy practitioners alike have asked that the theoretician engage in action-oriented research.

Numerous strategies have been forwarded in order to carry out this request. For example, scholars have been urged to focus on design exercises; use manipulable independent variables; employ less abstract dependent variables; and be more attentive to the problems surrounding the transmission of empirical findings from the academic to the policymaking community.<sup>20</sup> To be sure, all of these suggestions would help overcome the frequent failure of decisionmakers to use the results of international relations research. But perhaps a more fundamental strategy would simply be to reverse the conventional format of independent and dependent variables, and then shift our research attention to impact evaluation. Whereas in pure research one begins with a dependent variable  $y$  and tests whether independent variables  $x_1, x_2, x_3, \dots, x_n$  will explain its variation, in evaluation research the opposite occurs. That is to say, one begins with an independent variable (activity  $x$ ) and asks whether it will achieve outcome  $y$ . The major difference between the former and the latter, writes Suchman, is one of purpose and not of method; "evaluative research is, first and foremost, *research* and as such must adhere as closely as possible to currently accepted standards of research methodology."<sup>21</sup> Thus, by treating policy outputs as independent variables and adhering to the canons of evidence found in social science, one should be able to provide the decisionmakers with highly relevant findings; most notably, an answer to the very practical question of what impact resulted from a particular activity.

There are two distinct ways to conduct evaluation research. The most common approach is to use a "goal attainment" model. Simply stated, this type of model requires that the investigator begin an evaluation by translating a given program's general goals into a group of specific, measurable objectives. Next, it calls upon him to examine the

outcome of those activities designed to achieve each objective. Finally, it directs the investigator to conclude the evaluation by appraising these program activities on the basis of effectiveness criteria which have been established in accordance with either a preexisting absolute standard of excellence, or some relative standards that reflect the past performance of similar programs.

The second approach to evaluation research is through a "systems" model. Rather than looking at the outcome of one decision unit's activities, the investigator examines the larger behavioral whole formed by the interrelationship between a set of decision units. Seen in this light, an application of a goal attainment model to the study of arbitral activity would lead one to analyze the responsive stage of the foreign policy process, while the systems model would lead to an analysis of the empirical contingency between systemic activity and outcomes.<sup>22</sup> Although there are many compelling arguments in favor of both molecular and molar studies of arbitration, Hoffmann proposes that we begin "by stressing the links between international law and historical international systems."<sup>23</sup> Gould and Barkun agree, and add that "much work needs to be done on changes in the law that take place concurrently with or as a consequence of basic changes in the international system."<sup>24</sup> Similarly, Onuf has noted that a quantitative analysis of international law could prove useful "if trends in the law were measured and these trends correlated with other forms of social change."<sup>25</sup> As a result of these suggestions, plus Singer's contention that research priority must be given initially to understanding those ecological factors that provide the context within which nations behave,<sup>26</sup> the decision was made to utilize the systems model for evaluating the impact of arbitral activity on interstate conflict.

*The Spatio-Temporal Domain.* With the outlines of our evaluation model now set, let us turn to the issue of how it will be employed to analyze arbitration efforts. Since many authors have charged that international law has only reflected the normative orientations of the most active and influential states, the composition and membership criteria of Singer and Small's central and major power systems will be used to define the spatial domain of this study.<sup>27</sup>

Selecting the temporal domain, however, presents a greater methodological problem. While the literature on diplomatic history is rife with alternative chronological breakpoints which allegedly differentiate one historical international system from another, in the main these watersheds have been established by postulation. As Hinsley

writes, such judgmental assessments suffer from at least two major failings:

Historians are liable to ante-date the *completion* of massive movements because of their preoccupation with origins. They are given to ante-dating the *beginnings* of massive developments for the same reason and also because such developments are rarely finally completed: when the end of one phase is usually but the preliminary to the onset of the next it is easy to mistake the onset of another phase for the beginning of an entirely new departure.<sup>28</sup>

In view of the theoretical plausibility of several alternative benchmarks since the Jay Treaty, plus our inability to choose between them until the range of behavioral oscillations within the international system has been grounded with observational data, perhaps it would prove useful to adopt a different approach to examining the impact of arbitration. Instead of attempting to deal with a sequence of discrete systems whose temporal boundaries have yet to be ascertained, the following analysis simply will focus on the period bounded by the Congress of Vienna and World War I insofar as many scholars consider this era to have been one in which the perceived salience of conflict resolution through interstate arbitration reached its zenith.

Several reasons have been given for this attitude. Some writers point to the importance of the arbitral settlement of US claims that the United Kingdom had violated her neutrality by permitting the Confederate privateer *Alabama* and its supply ship *Georgia* to be constructed in British shipyards.<sup>29</sup> "If the Jay Treaty of 1794 rescued arbitral process as a means of settling international disputes from desuetude," argue Simpson and Fox, "the *Alabama claims* arbitration . . . gave the process a new impetus . . ."<sup>30</sup> It is thought that this momentum was induced by the utilization of a novel tribunal structure to successfully resolve conflict between what Fawcett called the "vital interests" of the two countries.<sup>31</sup> Under the 1871 Washington Treaty each state appointed one member to the arbitral tribunal, and additional members were selected by the Emperor of Brazil, King of Italy, and President of the Swiss Confederation. With the precedent of a collegiate international tribunal established, students of international law generally conclude that arbitration gained renewed prestige and widespread popularity.<sup>32</sup>

Still other writers point to the importance of additional events as an indication of the upswing in the perceived salience of third-party arbitration as a mode of conflict resolution. Rhyne, for instance, asserts

that the settlement of the 1892 *Behring Sea Seal Fisheries* case "greatly enhanced the prestige of arbitration as an important method of the peaceful settlement of international disputes."<sup>33</sup> In contrast, Read and Tung stress the impetus given to arbitration by the establishment of the Permanent Court of Arbitration at the First Hague Conference.<sup>34</sup>

Nor do these contemporary observations differ from the assumptions 19th century publicists held about the efficacy of arbitration. As Figure 1 shows, the perceived salience of conflict resolution through interstate arbitration steadily increased following the Congress of Vienna, declining slightly at the turn of the last century. Alternatively, the perceived importance of nonbinding modes of conflict resolution only increased until the 1870's, and rapidly declined thereafter falling to its nadir prior to the outset of World War I.<sup>35</sup> In summary, owing to the vast amount of theorizing which focuses upon the use of arbitration by the most active and influential states in the century following the Napoleonic Wars, we shall limit our study to that spatio-temporal domain during which arbitration allegedly had a major role in preserving peace.

*Variable Operationalization and Hypothesis Construction.* Having abstracted from the literature on dispute settlement the proposition that arbitral activity and war are inversely related, our next step will be to reformulate this middle-gauge theoretical assertion into more narrow testable hypotheses. Before this can be done indicators must be found for each of the concepts in the above proposition. Thus, let us first define the independent variables.

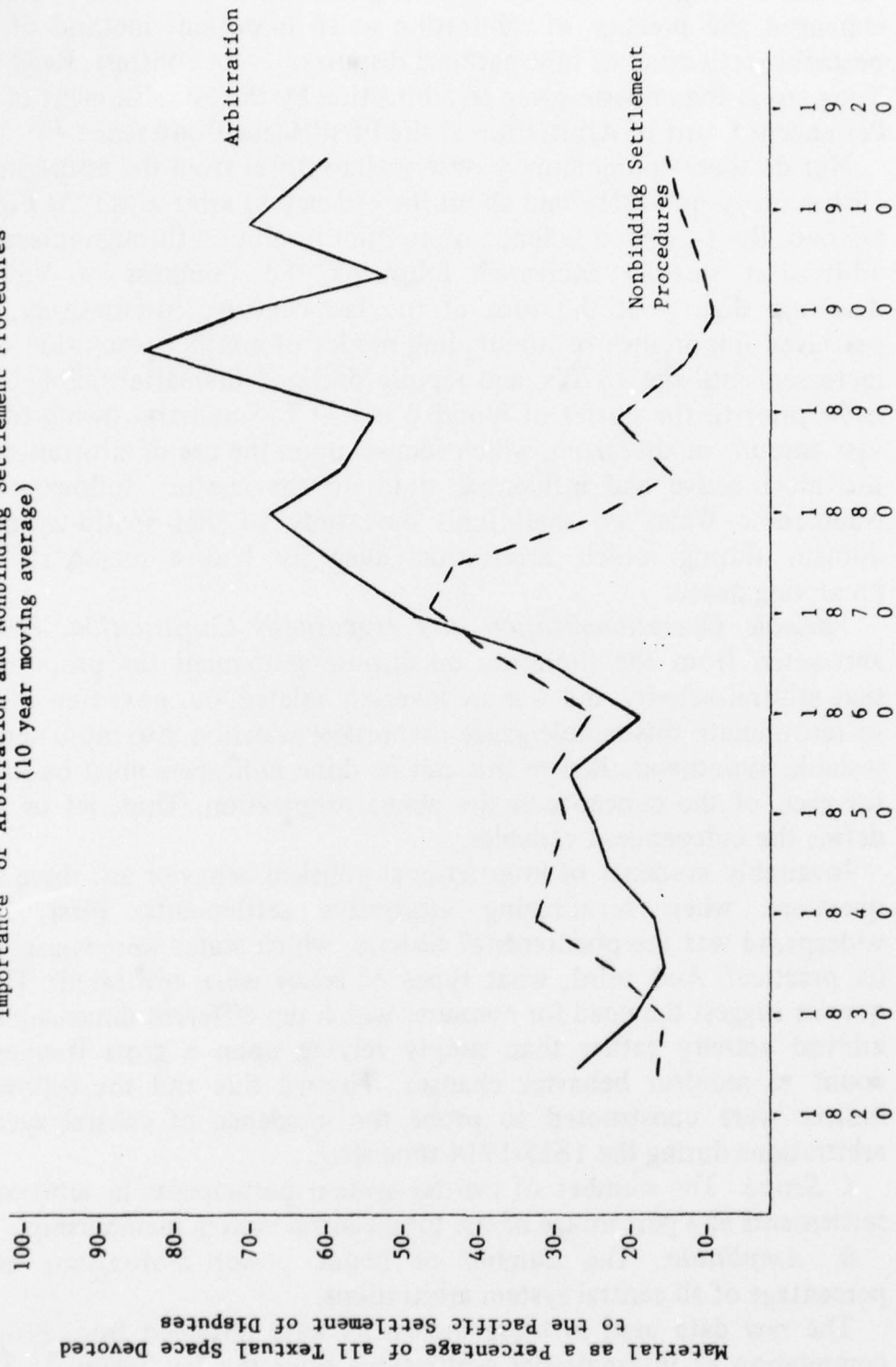
Invariably students of international political behavior ask three key questions when scrutinizing arbitral settlements. First, how widespread was the phenomena? Second, which states were engaged in its practice? And third, what types of issues were arbitrated? These queries suggest the need for measures which tap different dimensions of arbitral activity rather than simply relying upon a gross frequency count to monitor behavior changes. Toward this end the following indices were constructed to probe the incidence of central system arbitrations during the 1815-1914 time span:

*i. Scope.* The number of central system participants in arbitral settlements as a percentage of the total central system membership.

*ii. Amplitude.* The number of major power arbitrations as a percentage of all central system arbitrations.

The raw data used in these indicators were obtained from Stuyt's compilation of international arbitrations since the Jay Treaty.<sup>36</sup> This

Figure 1: Diachronic Fluctuations in Beliefs Regarding the Importance of Arbitration and Nonbinding Settlement Procedures (10 year moving average)

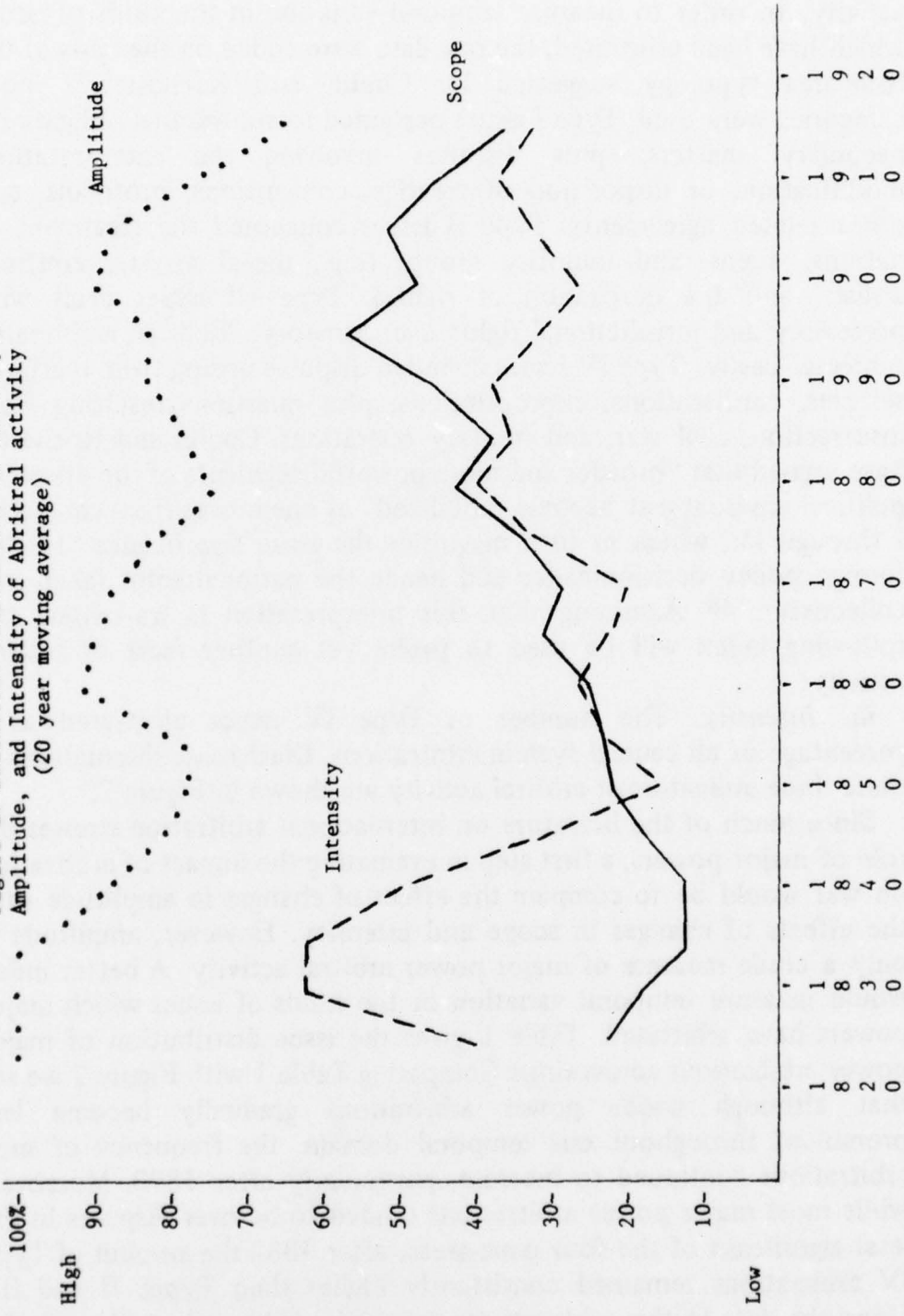


data source also furnished the ingredients for a third index of arbitral activity. In order to measure temporal variation in the kinds of issues which have been arbitrated, the raw data were coded on the basis of the issue-area typology suggested by Coplin and Rochester.<sup>37</sup> Four categories were used. Type I issues pertained to contractual obligations, pecuniary matters, plus disputes involving the interpretation, modification, or disposition of treaties, conventions, protocols, and other related agreements. Type II issues concerned the treatment of nations, aliens, and minority groups (e.g., illegal arrests, arbitrary arrests, and the derogation of rights). Type III issues dealt with possessory and jurisdictional rights over territory, fisheries, and related subjects. Lastly, Type IV issues included disputes arising from maritime seizures, confiscations, expropriations, plus questions resulting from insurrection, civil war, and military operations. Coplin and Rochester have argued that "broader and more powerful segments of the domestic political environment become mobilized" as one moves from categories I through IV, which in turn magnifies the issue significance "for the foreign policy decisionmaker and hence the national actor taken as a collectivity."<sup>38</sup> Assuming that this interpretation is warranted, the following index will be used to probe yet another facet of arbitral activity:

*iii. Intensity.* The number of Type IV issues arbitrated as a percentage of all central system arbitrations. Diachronic fluctuations in these three indicators of arbitral activity are shown in Figure 2.

Since much of the literature on international arbitration stresses the role of major powers, a first step in evaluating the impact of arbitration on war would be to compare the effect of changes in amplitude with the effects of changes in scope and intensity. However, amplitude is only a crude measure of major power arbitral activity. A better index would measure temporal variation in the kinds of issues which major powers have arbitrated. Table 1 gives the issue distribution of major power arbitrations across time. Comparing Table 1 with Figure 2 we see that although major power arbitrations gradually become less prominent throughout our temporal domain, the frequency of such arbitrations continued to increase, particularly after 1890. Moreover, while most major power arbitrations tended to be over disputes in the least significant of the four issue-areas, after 1832 the amount of Type IV arbitrations remained consistently higher than Types II and III. Using the data in this table we can take a second step in evaluating the impact of arbitral activity on war by creating the following index:

Figure 2: Diachronic Fluctuations in the Scope, Amplitude, and Intensity of Abridged activity (20 year moving average)



iv. *Salience*. The number of Type IV issues arbitrated by major powers as a percentage of all major power arbitrations.

So far we have undertaken a reconnaissance flight in order to

TABLE 1  
ISSUE DISTRIBUTION OF MAJOR POWER ARBITRATIONS  
(percentage figures\*)

Diplomatic Period **	Issue-Area				
	I	II	III	IV	N
1815-1821	56%	11%	22%	11%	9
1822-1847	58	8	8	25	12
1848-1870	42	21	17	21	24
1871-1889	34	7	28	31	29
1890-1914	42	8	20	29	109
Total	43%	10%	20%	27%	183

\* Rows may not equal 100% due to rounding error

\*\* The breakpoints used here are derived from Richard N. Rosecrance, *Action and Reaction in World Politics* (Boston: Little, Brown and Company, 1963).

describe the contours of the arbitration data within our spatio-temporal domain. Shifting now to the procedures used in operationalizing war, one immediately notes that there seem to be as many definitions of the concept as there are writers. The operational definition and historical data used here have been formulated by Singer and Small.<sup>39</sup> In order to be classified as an international war, a conflict must involve: (1) at least one political entity with a population of 500,000 and/or diplomatic recognition by France or Great Britain; and (2) over 1,000 battle casualties among all participants. Once again our concern is with more than just the mere frequency of a particular class of behavior. Therefore we shall look at two different dimensions of war:

v. *Magnitude*. The number of nation-months resulting from all wars which began during a given time span.

vi. *Severity*. The number of battle-connected deaths resulting from all wars which began during a given time span.

Having discussed our operational indicators of both arbitral activity and war, it is now possible to state those evaluation hypotheses which will be tested in order to make an inference about the consequences of arbitration. Specifically, it is expected that all four measures of arbitral activity will be inversely related to the magnitude and severity of war begun. To determine whether this is the case, two separate analyses will be run. In the first we shall examine: (1) the simple bivariate relationships between changes in the scope, amplitude, and intensity of arbitral activity and changes in the magnitude and severity of *central system* war begun; (2) the combined impact and relative potency of these three arbitration variables; and (3) the overall association between the five indicators taken as two distinct sets of variables. In the second analysis we shall turn our attention to the *major power system* for an investigation into the relationship between the salience of arbitral activity and the magnitude and severity of major power war begun.<sup>40</sup>

#### TESTING THE EVALUATION HYPOTHESES

*A First Probe of the Data.* Several methodological assumptions were made when the arbitration and war data were organized for a statistical analysis of the first group of issues listed above. First, it was assumed that one could decompose the empirical world into hierarchical, unidirectional relationships which could be represented by a group of recursive equations whose coefficients might be estimated through ordinary least-squares regression. Second, it was assumed that the dynamic nature of reality could be captured through the use of rates of change and lagged exogenous variables. Rates of change may be introduced into a regression equation in various ways. If time is interpreted as continuous, then rate of change may be expressed by the derivative of  $x$  with respect to time ( $dx / dt$ ) in a differential equation. Alternatively, if time is viewed in terms of discrete periods, then one might use delta values ( $x_t - x_{t-1}$ ) in a difference equation. Because the data employed in this study are averages over half-decades rather than instantaneous readings such as a speedometer provides, a third assumption was made that difference equations would be appropriate for our purposes, even though time is in fact continuous.<sup>41</sup>

Table 2 shows the Pearson product-moment correlations between delta values and the scope, amplitude, and intensity of arbitral activity and delta values of the magnitude and severity of war begun, where the first three variables have been lagged one time unit. Although the hypothesized direction in the relationships between scope, intensity, and the two dependent variables appeared during the 1815-1914 span, the latter two correlations are not particularly strong. Furthermore, the anticipated inverse relationships between amplitude and the magnitude and severity of war begun did not materialize. Indeed the correlations are so weak that there does not seem to be any association between an increase in the percentage of major powers participating in arbitral settlements at a given period and the amount of war which followed. In sum, these bivariate relationships suggest that only the scope of arbitral activity has the predicted moderately strong inverse relationship with the onset measures of war, and these correlations are robust enough that they had less than a 5 percent probability of occurring by sheer chance. Interestingly enough, a comparison of Figures 1 and 2 shows that the perceived importance of arbitration as a mode of conflict resolution also tends to co-vary with the scope rather than the amplitude or intensity of arbitral activity.

TABLE 2  
BIVARIATE CORRELATIONS BETWEEN INTERSTATE ARBITRATION  
AND THE ONSET OF WAR

Lagged Dimension of Arbitral Activity	Amount of Central System War Begun	
	Magnitude	Severity
Scope	-.62*	-.56*
Amplitude	.10	.01
Intensity	-.37	-.24

\* Significant at the .01 level with a one-tailed t-test

Besides looking at the bivariate relationships, we also are interested in the relative potency and additive impact of the three independent variables upon war. The statistical procedure used to ascertain the causal potency of each variable was stepwise multiple regression. In essence, this technique represents "something of a halfway house between multiple regression analysis and full multiequation causal models."<sup>42</sup> It computes a sequence of multiple linear regression equations adding that one variable at each step which makes the greatest reduction in the error sum of squares, possesses the highest correlation with the dependent variable partialled on the variables which have already been added, and has the highest *F* value. The use of this procedure has several advantages over standard multiple regression. In the first place, stepwise regression rank orders the independent variables according to their relative potency and, as Alker points out, this ordering has a causal interpretation in that "the various partial regression slopes measure direct effects."<sup>43</sup> In the second place, the relative potency of any independent variable calculated with standard multiple regression may be artifactual insofar as this procedure simply regresses the first predictor variable provided by the independent variable list on the dependent variable, determines the residuals and then regresses these residuals against the second listed independent variable, and so on. Given that stepwise multiple regression iteratively searches the entire list of independent variables for the single variable which best accounts for the variance in the dependent variable and then analyzes every *n*-variable combination for the best model, it seems to constitute the most suitable procedure for our purposes.

Tables 3 and 4 present the results of the stepwise multiple regression analysis. As can be seen by its entry on the first step of the regression equations, the scope of arbitral activity is clearly the most potent of the three independent variables in accounting for both the magnitude and severity of war begun. In contrast, intensity still ranks as the second most potent variable in each equation; while amplitude, the least potent of the three variables does not even appear in the magnitude equation. Taking the independent variables in each regression together we can account for 47.5 percent of the variance in the magnitude of war begun, and 35.5 percent of the variance in the severity of war begun. Correcting the sample size and the number of independent variables, however, these figures fall to 44.1 and 27.4 respectively.<sup>44</sup> In other words, our arbitration variables do moderately well in explaining the size of ensuing wars, but do not account very well for their destructiveness.

TABLE 3  
 A STEPWISE MULTIPLE REGRESSION AND PATH  
 ANALYSIS OF THE MAGNITUDE OF WAR BEGUN

Step Number	Independent Variable Entered	Increase in Multiple Coefficient of Determination
1	Scope	.3785
2	Intensity	.0959

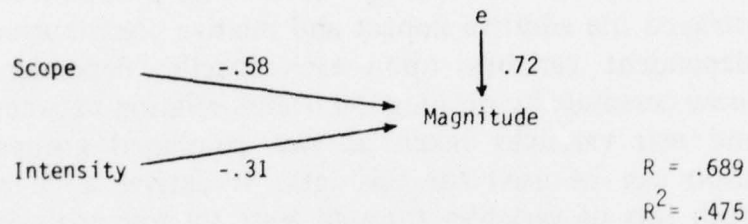
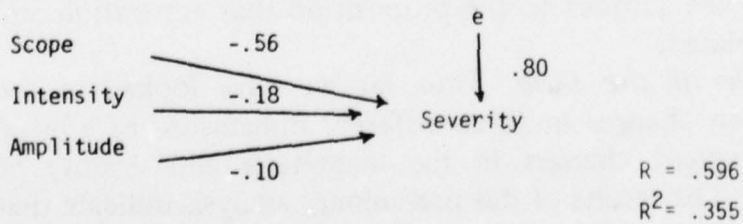


TABLE 4  
 A STEPWISE MULTIPLE REGRESSION AND PATH  
 ANALYSIS OF THE SEVERITY OF WAR BEGUN

Step Number	Independent Variable Entered	Increase in Multiple Coefficient of Determination
1	Scope	.3095
2	Intensity	.0352
3	Amplitude	.0100



Along with the multiple regression results, Tables 3 and 4 also contain simple path diagrams which show the direct effect of each independent variable in the stepwise models upon the dependent variables. These paths are standardized partial regression coefficients. Since multicollinearity is not a problem in either regression,<sup>45</sup> the indirect effect of each independent variable on the onset measures is negligible. The most notable direct effect which appears is the negative relationship between scope, magnitude, and severity. Once again the intensity of arbitral activity is inversely related to the amount of war begun, though it has a greater impact upon the magnitude of those wars. Finally, the percentage of major powers settling their disputes through arbitration likewise displayed the hypothesized negative impact upon the severity of war, but the relationship was not very pronounced.

Having thus portrayed the additive impact and relative contribution of the three independent variables upon each specific dependent variable, we may now conclude by probing the overall relation between the arbitration and war variables taken as two combined groups. Canonical correlation can be used for this task. It derives a linear composite from both sets of variables through least squares analysis, and then finds the maximum correlation between the two sets. Because canonical correlation is a generalization of multiple regression with  $m$  dependent variables, more than one equation is calculated, and more than one canonical correlation is produced. The trace correlation provides a measure of the relationship between all of the resulting canonical correlations. Hence, the square of the trace correlation gives the proportion of variance in one set of variables which can be accounted for by the other.<sup>46</sup> When a canonical correlation analysis was performed on the three arbitration variables and the two war variables, the squared trace correlation indicated that only 34 percent of the variance in central system war could be accounted for by arbitral activity. Although a linear composite of the former cannot explain much of the total variance in the linear composite of the latter, the earlier multiple regression analysis of each individual dimension of war begun still lends some support to the proposition that arbitration and war are inversely related.

*A Second Probe of the Data.* Thus far we have looked at the relationship between changes in three different dimensions of arbitral activity and subsequent changes in the magnitude and severity of central system war. The results of this preliminary analysis indicate that the amount of interstate arbitration tends to have more of an effect

upon the size and duration of wars than upon their destructiveness. In addition, our results also show that the proportion of states willing to settle their quarrels through binding third-party procedures constitutes the most important aspect of arbitral activity. To put it another way, changes in the percentage of major powers which choose to arbitrate their disputes do not seem to be strongly associated with any decline in the onset of future war. But, before rendering any final judgement on major power activity, a second analysis is in order—one which assesses the impact of great power arbitrations from an alternative perspective.

In order to examine the impact of major power arbitrations more closely, we shall test the hypothesized inverse relationship between lagged values of the salience of arbitral activity and the amount of major power war begun. Once more, two onset measures of war shall be used: magnitude—the number of nation-months resulting from all major power wars which began during each 5-year period, normalized for system size; and severity—the  $\log(x + 1)$  value of battle deaths from all major power wars which began during a given half-decade. However, this time absolute rather than delta variable will be used in our analysis.<sup>47</sup>

TABLE 5  
THE RELATIONSHIP BETWEEN THE SALIENCE  
OF ARBITRAL ACTIVITY AND THE ONSET OF WAR

	Amount of Major Power War Begun	
	Magnitude	Severity
Rank-Order Correlation	-.37	-.68
Product-Moment Correlation	-.22	-.50
<u>t</u> -test (df=17)	-.91	-2.39
Regression Coefficient	-7.63	-2.92
Standard Error of Estimate	10	1.53

Table 5 presents the results from this analysis. The most obvious finding is that the regression and correlation coefficients all are in the predicted negative direction. By having arrived at these results through two different procedures, our confidence in them has been substantially increased. It is also noteworthy that salience accounts for much more of the variance in our dependent variables than amplitude. Thus, although the previous analysis suggested that major power arbitrations did not have much impact upon war, it is now evident that the arbitration of certain types of issues by great powers does have significant implications for conflict resolution, especially when one examines the severity of subsequent wars.

### SYSTEM STRUCTURE AND ARBITRAL ACTIVITY

With our tests of the evaluation hypotheses now behind us, we can now turn to the question of the international "climate" necessary for major powers to arbitrate their most important differences. While there are many properties of the international system which could be analyzed, much of the literature on pacific methods of conflict resolution points to the role of military capability, or war potential, as a key determinant of the salience of arbitral activity.

According to Rostow, the most important issue presently facing the US foreign policymaking community is whether the diffusion of military power throughout the world can be organized in ways that lead to peace rather than violence and chaos.<sup>48</sup> One school of thought on this issue of capability distribution holds that the probability of war decreases whenever military power is concentrated in the hands of a few countries.<sup>49</sup> While a consensus has yet to materialize over the precise threshold deemed necessary, most scholars of this persuasion state that high levels of capability concentration breed order and predictability since mutual spheres of interest are clearly defined, and the dominant actors are able to moderate the use of force by others. Given this premise, amicable procedures of grievance settlement presumably would flourish within such an environment.

In opposition to this view, many individuals contend that, instead of being conducive to peaceful intercourse, situations of preponderance are inherently unstable. Drawing upon the experience of national economic systems, Modelski has argued that markets dominated by a few large firms are subject to the instabilities of cutthroat competition and the "havoc that is liable to be wrought by the collapse of one of

these giants . . .”<sup>50</sup> An important corollary which is often added states that the amount of international violence is determined by the rate at which capabilities move between major powers. The rationale behind this supposition lies in the alleged impact of systemic uncertainty. Since relative strength is difficult to assess during periods of fluidity, national leaders are said to be wary of engaging potential adversaries on the battlefield whenever capabilities are in a state of flux.<sup>51</sup> Shifts in the distribution of power, therefore, may prompt states to use peaceful means to settle disputes.

To be sure, advocates of the preponderance school disagree. In their estimation any such flexibility might impede conflict management. If we are to curtail the incidence of warfare, they insist that obstacles to decisionmaker misperception must be eradicated. Thus, as long as the apportionment of capabilities between a few major powers remains fixed and conspicuous, it is felt that the possibility of war through miscalculation will be minimized and, in turn, the incidence of pacific settlements will increase.

On what grounds are we to choose between these competing perspectives? Clearly, no theoretical agreement exists on the causal nexus between capability distribution and the use of conflict resolution procedures; and, to date, the empirical results from data-based studies have not shed enough light on the matter to allow us to reject either view.<sup>52</sup> Consequently, the following two variables will be used to study the impact of capability distribution on the salience of arbitral activity:

*vii. Concentration.* The extent to which demographic, industrial, and military capabilities are concentrated among the major powers.

*viii. Movement.* The number of percentage-of-capabilities shares which have been exchanged within the major power system. Both variables come from data collected by the Correlates of War Project.<sup>53</sup> The former combines six separate indicators of a nation's war potential (i.e., total population, urbanization, energy consumption, iron or steel production, military expenditures, and armed forces size) into a composite score; and then measures the extent to which these capabilities are concentrated among the great powers. By way of contrast, the latter monitors any shifts in the composite capability shares held by each nation within the major power system. The values of these variables have been aggregated by half-decade and lagged one time unit for our analysis.

Table 6 gives the results from the analysis of the relationship between capability concentration, movement, and the salience of

TABLE 6  
THE RELATIONSHIP BETWEEN CAPABILITY DISTRIBUTION  
AND THE SALIENCE OF ARBITRAL ACTIVITY

	<u>Dimension of Capability Distribution</u>	
	<u>Concentration</u>	<u>Movement</u>
Rank-Order Correlation	-.21	-.54
Product-Moment Correlation	-.12	-.49
t-test (df=16)	-.48	-2.24
Regression Coefficient	-1.47	-57.19
Standard Error of Estimate	.30	.26

Salience = .92    -.07 Concentration    -1.13 Movement

R = .50

R<sup>2</sup> = .25

Standard Error = .27

arbitral activity.<sup>54</sup> Looking at the bivariate results first, we see that both independent variables are inversely related to the dependent variable. Capability movement is moderately related to salience, but there is only a weak association between concentration and arbitration salience. When we compare the standardized regression coefficients in the multivariate analysis, these preliminary results are sustained. The degree of capability movement among the major powers is the most potent of the two predictor variables. Indeed, the multivariate model does little better than the bivariate capability movement model in accounting for the salience of arbitral activity. In summary, then, during the period between the Congress of Vienna and World War I, the major powers tended to arbitrate important issues whenever little movement of capabilities occurred among these countries; and, to a lesser extent, whenever war potential was diffused within the system.

## CONCLUSIONS

The codification of international law has long been sought by advocates of world peace through interstate arbitration. Yet, despite the many notable attempts to organize legal cases into a coherent body of law, researchers have been hesitant to convert this wealth of information into longitudinal data which could be used to examine diachronic changes in arbitral activity. Instead they have preferred to do idiographic studies of discrete cases involving arbitration. While these works are extremely important for the insights they give us on the particular cases they study, they cannot establish nomic generalizations regarding the causes or consequences of arbitral activity.

But this study has not attained that objective either. While our ultimate goal is to establish those covering laws necessary for deductive-nomological explanations, the research findings uncovered here are simply contingency generalizations which possess several limitations. First, because the magnitude and severity of war which actually occurred was regressed against arbitral activity, this study does not tell us what "potential" wars were prevented, or what might have happened without arbitration. Second, the possibility of a nonrecursive relationship between our variables was not examined though preliminary evidence shows that a positive association exists between the termination of war and the incidence of arbitration. And third, owing to the restricted spatio-temporal domain which was analyzed, the question still remains over whether the same relationships found in this study also existed during other periods.

Nonetheless the correlational knowledge uncovered in this study has allowed us to undertake an evaluation of international arbitration from the perspective of a systems model. During the two decades which have elapsed since George Kennan's trenchant criticism of the "moral-legalistic" approach to international problems, the impact of such conflict resolution procedures as arbitration has been debated without one side being able to muster enough substantiation to convince the other. The aim of this study has been to obtain empirical evidence on whether, during its heyday, major power arbitrations had any effect on war and, if so, under what conditions did they occur. We have found that, when war potential was spread among the major powers and national capabilities showed little movement, the great powers tended to arbitrate important issues, and these arbitrations had a dampening effect on future war. Today arbitration still is used as a

mode of conflict resolution. Reithel's analysis of 34 pacific settlement treaties and 2,017 clauses taken from 8,661 treaties registered with the United Nations from 1945 through 1965 indicates that arbitration ranked second only to negotiation in the number of times it was mentioned.<sup>55</sup> Hence, by engaging in an evaluation of previous arbitration efforts we have taken a step closer to determining whether the optimism of Archidamus or the pessimism of Chuang Tzu provides us with better counsel on the ramifications of these treaty commitments.

## ENDNOTES

1. Adda B. Bozeman, *Politics and Culture in International History*, Princeton: Princeton University Press, 1960, p. 22.
2. See Coleman Phillipson, *International Law and Custom of Ancient Greece and Rome*, 2 vols., London: Macmillan, 1911; and Marcus N. Todd, *International Arbitration Amongst the Greeks*, Oxford: Clarendon Press, 1963.
3. Bozeman, *Politics and Culture*, pp. 83-84.
4. A parallel may be seen in the Islamic world. The Prophet Muhammad not only respected the traditional Arabic practice of arbitration, but he often acted as an arbitrator himself. Majid Khadduri, "An Introduction to the Islamic Law of Nations," in *Comparative World Politics, Readings in Western and Premodern Non-Western International Relations*, ed. by Joel Larus, Belmont, California: Wadsworth Publishing Company, Inc., 1964, p. 237.
5. Jackson H. Ralston, *International Arbitration From Athens to Locarno*, Garland Library, Stanford: Stanford University Press, 1929, p. 191. The Jay Treaty provided for the arbitration of three disputes between the United Kingdom and United States: (1) the boundary of the St. Croix River; (2) the recovery of debts owed to British merchants by citizens of the United States; and (3) ascertaining the losses and damages suffered by US citizens as a result of British maritime seizures.
6. Roger D. Masters, "World Politics as a Primitive Political System," in *International Politics and Foreign Policy*, ed. by James D. Rosenau, New York: Free Press, 1969, p. 112.
7. Charles W. Kegley, Jr., "Measuring the Growth and Decay of Transnational Norms Relevant to the Control of Violence," paper presented at the 1974 annual meeting of the American Political Science Association, Chicago, Illinois, August 29-September 2, 1974, pp. 23, 35-36.
8. Inis L. Claude, Jr., *Swords Into Plowshares, The Problems and Progress of International Organization*, 3rd ed., New York: Random House, 1964, p. 204.
9. Thomas C. Schelling, *Arms and Influence*, New Haven: Yale University Press, 1966, p. 140.
10. Lillian Randolph, *Third Party Settlements of Disputes in Theory and Practice*, Dobbs Ferry, New York: Oceana Publications, Inc., 1973, p. 2.
11. William D. Coplin, *The Functions of International Law*, Chicago: Rand McNally, 1966, p. 79. For a contending view, see Heinrich von Treitschke, "International Law and International Intercourse," in *Theory of International Relations*, ed. by M. G. Forsyth, H. M. A. Keens-Soper, and P. Savigear, New York: Atherton Press, p. 339.
12. John Chipman Gray, *Nature and Sources of the Law*, New York: Macmillan, 1927, p. 127.
13. James N. Rosenau, "Assessment in International Studies: Ego Trip or Feedback," *International Studies Quarterly*, XVIII, September 1974, p. 362.
14. Cf. Eugene F. Miller, "Positivism, Historicism, and Political Inquiry," *American Political Science Review*, LXVI, September 1972, 796-817; and David Easton, "The New Revolution in Political Science," *American Political Science Review*, XVIII, December 1969, 1051-61.
15. See respectively Charles Burton Marshall, "Waiting for the Curtain," *SAIS*

Review, Summer 1966, 21-26; Anatol Rapaport, "Is Peace Research Applicable?" *Journal of Conflict Resolution*, XIV, September 1970, 277-86; and Noam Chomsky, "The Menace of Liberal Scholarship," *New York Times Review of Books*, XI, January 1969, 278-92.

16. Arnold Brecht, *Political Theory, The Foundations of Twentieth Century Political Thought*, Princeton: Princeton University Press, 1959, p. 14.

17. Abraham Kaplan, *The Conduct of Inquiry, Methodology for Behavioral Science*, San Francisco: Chandler Publishing Company, 1964, p. 381.

18. Colin S. Gray, "The Practice of Theory in International Relations," *Political Studies*, XXII, June 1974, 140.

19. J. Eayrs, *Right and Wrong in Foreign Policy*, Toronto: University of Toronto Press, 1966, p. 54.

20. See, for example, Davis B. Bobrow, "The Relevance Potential of Different Products," in *Theory and Policy in International Relations*, ed. by Raymond Tanter and Richard H. Ullman, Princeton: Princeton University Press, 1972, pp. 204-28; James S. Coleman, *Policy Research in the Social Sciences*, Morristown, New Jersey: General Learning Press, 1972; Michael K. O'Leary, et al., "The Quest for Relevance, Quantitative International Relations Research and Government Foreign Affairs Analysis," *International Studies Quarterly*, XVIII, June 1974, 211-37; and Allen S. Whiting, "The Scholars and the Policy-Makers," in *Theory and Policy in International Relations*, pp. 229-47.

21. Edward A. Suchman, *Evaluation Research, Principles and Practice in Public and Social Action Programs*, New York: Russell Sage, 1967, p. 12. The overlap between pure and evaluation research can easily be uncovered by comparing Walter Wallace, *The Logic of Science in Sociology*, Chicago: Atherton, 1971, with G. James, "Evaluation in Public Health Practice," *American Journal of Public Health*, VII, July 1962, 1145-54. Both discuss research in terms of a dynamic, circular process. As seen by Wallace, pure research moves from theory to hypothesis when a researcher operationalizes his variables. James portrays a very similar process when he discusses the movement from goals to objectives via the construction of performance criteria. Additionally, both individuals then touch upon data collection, observation, and finally acceptance or modification of the initial theory/goal as the final steps in the research cycle.

22. For a further elaboration on the differences between the goal attainment model and the various systems approaches to evaluation, see Herbert C. Schulberg and Frank Baker, "Program Evaluation Models and the Implementation of Research Findings," *American Journal of Public Health*, LVIII, July 1968, 1248-55; Alfred P. Parsell, *Dynamic Evaluation: The Systems Approach to Action Research*, Santa Monica: Systems Development Corporation, 1966; and Amitai Etzioni, "Two Approaches to Organizational Analysis: A Critique and a Suggestion," *Administrative Science Quarterly*, IV, September 1960, 257-78.

23. Stanley Hoffman, "The Study of International Law and the Theory of International Relations," *Proceedings of the Fifty-Seventh Annual Meeting of the American Society of International Law*, Washington, DC, 1963, p. 30.

24. Wesley L. Gould and Michael Barkun, *International Law and the Social Sciences*, Princeton: Princeton University Press, 1970, p. 209.

25. Nicholas G. Onuf, "International Law-in-Action and the Numbers Game: A Comment," *International Studies Quarterly*, XIV, September 1970, 333.

26. This argument is developed at length by Singer in his "From a Study of

War to Peace Research: Some Criteria and Strategies," *Journal of Conflict Resolution*, XIV, December 1970, 527-42.

27. J. David Singer and Melvin Small, *The Wages of War 1816-1965: A Statistical Handbook*, New York: John Wiley & Sons, Inc., 1972.

28. F. H. Hinsley, *Power and the Pursuit of Peace*, London: Cambridge University Press, 1963, p. 153. Emphasis added.

29. For a representative sample of literature reflecting this opinion, see Norman D. Palmer and Howard C. Perkins, *International Relations, The World Community in Transition*, 3rd ed., Boston: Houghton Mifflin Co., 1969, p. 259; Charles P. Schleicher, *International Relations, Cooperation and Conflict*, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1954, p. 220; and Walter R. Sharp and Grayson Kirk, *Contemporary International Politics*, New York: Reinhart & Company, Inc., 1940, p. 458.

30. J. L. Simpson and Hazel Fox, *International Arbitration, Law and Practice*, New York: Praeger, 1959, p. 8.

31. J. E. S. Fawcett, *The Law of Nations*, New York: Basic Books, 1968, p. 21.

32. See Kurt von Schuschnigg, *International Law: An Introduction to the Law of Peace*, Milwaukee: Bruce Publishing Company, 1959, p. 298; and Ian Brownlie, *Principles of Public International Law*, 2nd ed., Oxford: Clarendon Press, 1973, p. 684.

33. Charles S. Rhyne, *International Law*, Washington, DC: C. L. B. Publishers, 1971, p. 17.

34. Elizabeth F. Read, *International Law and International Relations*, New York: American Foundation, Inc., 1925, p. 115; William L. Tung, *International Law in an Organizing World*, New York: Thomas Y. Crowell Company, 1968, p. 27. De Visscher gives an alternative interpretation. He notes that irrespective of the 1899 and 1907 Hague Conferences, the arbitral practice of states "showed hardly any change." That is to say, although the Hague Conference stimulated compulsory arbitration treaties, often they were limited by extensive reservations. The 1903 agreement between Britain and France, for example, established the maxim that disputes affecting the independence or honor of states would not be considered justifiable. Similar formulas were included within successive treaties thus restricting the principle of compulsory arbitration. Hence, as Dickinson's portrayal of the 1910 *North Atlantic Coast Fisheries* case indicates, the arbitrations conducted at the turn of the century resulted in "no credit to judicial statecraft, and no contribution to much needed confidence in the process of arbitration." Charles De Visscher, *Theory and Reality in Public International Law*, trans. by P. E. Corbett, Rev. ed., Princeton: Princeton University Press, 1968, p. 360; Edwin D. Dickinson, *Law and Peace*, Philadelphia: University of Pennsylvania Press, 1951, p. 85.

35. In order to measure the importance attached to arbitration by publicists of this epoch, 202 international law texts were content analyzed under the auspices of the Transnational Rules Indicators Project (TRIP). The index reported in Figure 1 is based upon the proportional space given to arbitration *vis-a-vis* other pacific methods of dispute settlement; i.e., good offices, commissions of inquiry, conciliation, mediation, and adjudication. Upon determining the percentage of textual space devoted by each author to arbitration, the mean for each 5-year interval was computed. This index correlated strongly ( $\gamma = .84, p < .001$ )

with a judgmental assessment made of each author's perception of arbitration. The index utilized to portray the perceived importance of nonbinding third-party procedures was constructed in the same way: the amount of text allocated to conciliation and mediation was aggregated by author, expressed as a percentage of the space devoted by him to all amicable means of dispute settlement, and then the mean score was recorded for each half-decade. The operational procedures used to convert the information found in legal texts into machine-readable data are outlined in Charles W. Kegley, Jr., Kyungsook Choi, and Gregory A. Raymond, "Coder's Manual for the Transnational Rules Indicators Project (TRIP)," Institute of International Studies, University of South Carolina, 1974, (Mimeographed).

36. A. M. Stuyt, *Survey of International Arbitrations, 1794-1970*, Leyden, Netherlands: A. W. Sijthoff, 1972.

37. William D. Coplin and J. Martin Rochester, "The Permanent Court of International Justice, the International Court of Justice, the League of Nations, and the United Nations: A Comparative Empirical Survey," *American Political Science Review*, LXVI, June 1972, 542. The major difference between their typology and the one used here lies in my collapsing of threatened and actual hostilities into one category (i.e., Type IV issues).

38. *Ibid.*

39. Singer and Small, *The Wages of War*, chs. 2-3, 7.

40. A note of explanation is in order here. The primary focus of this study is upon major power arbitrations. In the first analysis we shall analyze major power arbitrations by means of our amplitude index; that is, we shall compare the relative potencies of scope, amplitude, and intensity in terms of their respective impact on central system war. Once this has been done, we can then examine the relationship between salience and major power war for, unlike the previous three indices of arbitral activity, the salience index is only based upon the activities of Austria-Hungary, Britain, France, Prussia/Germany, Russia, Japan after 1895, and the United States after 1898.

41. Carl F. Christ, *Economic Models and Methods*, New York: John Wiley & Sons, Inc., 1966, p. 177. Also see Paul A. Samuelson, *Foundations of Economic Analysis*, Cambridge: Harvard University Press, 1947, p. 315.

42. Hayward R. Alker, Jr., "Statistics and Politics: The Need for Causal Data Analysis," in *Politics and the Social Sciences*, ed. by Seymour Martin Lipset, New York: Oxford University Press, 1969, p. 256.

43. *Ibid.*, p. 257.

44. The procedures for calculating the corrected multiple coefficient of determination ( $\bar{R}^2$ ) are discussed in M. Ezekiel and K. A. Fox, *Methods of Correlation and Regression Analysis*, New York: John Wiley, 1959, ch. 17.

45. The zero-order intercorrelation of the independent variables is as follows: scope-amplitude = -.21; scope-intensity = .10; and amplitude-intensity = .02.

46. J. W. Hooper, "Simultaneous Equations and Canonical Correlation Theory," *Econometrica*, XXVII, April 1959, 245-56.

47. The use of absolute values may increase the likelihood that trend and autocorrelation will influence the results of our correlation and regression analysis. Of the three variables, only magnitude possessed any linear trend ( $b = .50$ ). But, in view of that variable's low correlation with time ( $r = .27$ ), secular trend should not contaminate our study. Likewise, when the serial correlations

for each variable are compared with an Anderson table, the data appear suitable for further analysis. See R. L. Anderson, "Distribution of the Serial Correlation Coefficient," *Annals of Mathematical Statistics*, XIII, 1942, 8.

48. W. W. Rostow, *The Diffusion of Power*, New York: Macmillan, 1972, p. 578.

49. Examples of this position include: Charles P. Schleicher, *International Relations, Cooperation and Conflict*, Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1962, p. 138; John G. Stoessinger, *The Might of Nations*, New York: Random House, 1961, p. 180; and Robert Strauz-Hupe and Stefan Possony, *International Relations in the Age of Conflict Between Democracy and Dictatorship*, New York: McGraw-Hill, 1950.

50. George Modelski, *Principles of World Politics*, New York: Free Press, 1972, p. 137.

51. See Frederick H. Hartmann, *The Relations of Nations*, 4th ed., New York: Macmillan, 1973, pp. 361-62, 630; and Ernst B. Haas and Allen S. Whiting, *Dynamics of International Relations*, New York: McGraw-Hill, 1956, p. 50.

52. Haas, for example, has found a negative correlation between multipolarity and the use of legal means to change rules governing diplomatic relations. But he also has found that tight polarization has been associated with: (1) decreasing regulatory capacity; (2) a decline in the utilization of legal procedures; and (3) an emphasis upon proceduralism in juridical matters rather than resolving substantive issues. Michael Haas, *International Conflict*, Indianapolis, Indiana: Bobbs-Merrill, 1974, pp. 401-17.

53. J. David Singer, Stuart Bremer, and John Stuckey, "Capability Distribution, Uncertainty, and Major Power War, 1820-1965," in *Peace, War and Numbers*, ed. by Bruce M. Russett, Beverly Hills, California: Sage Publications, 1972, pp. 25-29.

54. Visual inspection of the scatterplots for each relationship seemed to indicate that a continued use of the linear regression model was in order. To check, the following alternative models were tested:  $y = b_0 + b_1 (\log_e x) + e$ , and  $y = b_0 + b_1 (1/x) + e$ . In the first model each value of the independent variable was transformed into its natural logarithm, and, in the second, into its reciprocal. However, neither of these curvilinear models fit the data as well as the simple linear model.

55. Curtis G. Reithel, "International Dispute Settlement: An Analysis of Dispute Settlement Clauses in Treaties," paper presented at the 1976 annual meeting of the International Studies Association, Toronto, Canada, February 25-29, 1976, p. 15.

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US Military Academy . . . . .	2
Marine Corps Development and Education Command . . . . .	3
National Defence College . . . . .	1
Royal College of Defense Studies . . . . .	1
L'Ecole Superieure de Guerre . . . . .	1
Fuehrungsakademie der Bundeswehr . . . . .	1
NATO Defence College . . . . .	1
Concepts Analysis Agency . . . . .	2
Intelligence Threat Analysis Detachment . . . . .	1
Training and Doctrine Command . . . . .	1
Combined Arms Combat Development Activity . . . . .	1
Studies, Analysis, and Gaming Agency . . . . .	1
Office of the Chief of Engineers . . . . .	1
Defense Advanced Research Projects Agency . . . . .	1
Defense Intelligence Agency . . . . .	2
Central Intelligence Agency . . . . .	3
Department of State . . . . .	2
Defense Logistics Studies Information Exchange . . . . .	1
Institute for Military Assistance . . . . .	1
US Army Federal Executive Fellow, Brookings Institution . . . . .	1
US Navy . . . . .	2
US Marine Corps . . . . .	2
US Air Force . . . . .	3
432d Military Intelligence Detachment . . . . .	1
434th Military Intelligence Detachment . . . . .	1
467th Military Intelligence Detachment . . . . .	1
I ROTC Region Headquarters . . . . .	1
II ROTC Region Headquarters . . . . .	1
III ROTC Region Headquarters . . . . .	1
IV ROTC Region Headquarters . . . . .	1
National Guard Bureau . . . . .	1
Defense Documentation Center . . . . .	12
Army Library . . . . .	1
Military History Research Collection . . . . .	1
Army War College . . . . .	57

