The Balance of Power in International History

THEORY AND REALITY

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Many observers have recently noted that the international system is evolving into a multipolar world. At the same time, the notion of balance of power is being severely criticized for its vagueness and inconsistency. Seven empirically testable propositions which exemplify refined and narrowed notions of balance of power are reviewed and analyzed in this paper. These propositions, authored by A. L. Burns, M. Kaplan, D. Singer and M. Small, F. H. Hinsley, R. Rosecrance, and F. Harary concern one of four major approaches to the multipolar system: (1) the rules of a theoretical balance of power system, (2) the functioning of alliances, (3) historical systemic periodization, and (4) the application of structural balance theory to the international system. The Situational Analysis Project provided the data for testing these propositions over the first twelve years of the "Bismarckian system," 1870 through 1881. The propositions did not hold up well under detailed testing. The rules of the balance of power system were violated–in particular, an "ingratiation effect" was found in place of the balance-restoring mechanism; alliances led to a lessening of cooperation and attention between allies; and historical periodization was found to be inaccurate. The findings, however, did support the fundamental assumption underlying the structural balance theory. Since the future may be quite like the nineteenth century in terms of structure, a reevaluation of the Bismarckian system is not an irrelevant exercise but rather an inquiry into the functioning of a system we may actually have to operate.

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The study of the balance of power is as ancient as international relations. Kautilya theorized about it; Thucydides advocated it as a policy. Whenever there was a system of multiple interacting states, some concern for balance among those states has existed (Seabury, 1965: Section I; Palmer and Perkins, 1969: 218-219). Hume and Rousseau were both enamored of it, and today the "balance of power" remains a venerable, if traditional, concept in the study of international relations. In recent years, the notion of a balance of power has been subjected to criticism for vagueness and inconsistency (Haas, 1953; Claude, 1962). Partly in response to these efforts at clarification, more specific propositions have been formulated. While we do not now possess anything like a formal theory of the balance of power, we have at least amassed an armory of empirically testable propositions.

Entirely aside from the traditional relevance of balance concepts, it is possible that the world is evolving into an international system in which balance and multipolarity will have far more application than they have had in recent years. It is already a truism that the bipolar world which emerged after 1947 has broken down. The alliances on both sides are in disarray. New powers, Japan and China, are taking a much larger role in world politics. In the short run, there is the prospect of a new focus of power in Western Europe. In the longer run, there is even the possibility of a reunited Europe which would inevitably have great consequences for the international system. The emergence of China has already been hailed as creating a "triangular" or "tripolar" relationship. Japan, Western Europe, and India will soon extend that tripolarity to quintipolarity or sextipolarity. Oddly enough, therefore, the future may be not unlike the nineteenth-century past. A reevaluation of the Bismarckian system of international relations, then, may not be an exercise in antiquarian irrelevance, but, rather, a significant inquiry into the structural workings of a system which we may actually have to operate in the future. For all these reasons, an examination of balance of power theories seems long overdue.

The Data Source

The basis of such an examination, however, has yet to be provided. Fortunately, as a result of work at Berkeley and Cornell on the Situational Analysis Project over the past three years, a data base has been created which will permit the testing of balance theories over the first eleven years

of the Bismarckian system, 1870-1881.[1] Coding procedures have been developed for abstracting all international interaction events from diplomatic historical treatments for the period 1870-1890 with intercoder reliabilities above eighty percent. This coding is not biased by interpretive differences among historians since it seeks only to isolate the atomic event, the interaction among states. Sample events are as follows:

- 1870 June 19 Hohenzollern Prince Leopold accepts the throne of Spain.
- 1870 July 6 French FM tells French Chambre des Deputés that France is absolutely opposed to the Hohenzollern candidacy.
- 1870 July 12 Prince Anton withdraws candidacy of Prince Leopold for the Spanish throne.
- 1870 July 12 French Emissary (Benedetti) demands that Prussia endorse Leopold's withdrawal and guarantee that candidacy will never be renewed.
- 1870 July 13 William I of Prussia refuses to accede to French demand for endorsement and guarantee.
- 1870 July 13 German Chancellor asks Russian FM (Gorchakov) for support against Austria-Hungary.
- 1870 July 13 Russian FM (Gorchakov) refuses to support Germany against Austria-Hungary.
- 1870 July 14 German Chancellor releases edited version of Ems interview which is designed to provoke France.
- 1870 July 19 France declares war on Prussia.

The diplomatic histories, in short, have been used as raw materials for the compilation of a master list of significant diplomatic events for the period 1870-1881. The use of these coding procedures at both Berkeley and Cornell make clear that replication of the master event list by other investigators is feasible given the high intercoder reliabilities attained.

Following the establishment of satisfactory coding procedures and a master list of the events, the Situational Analysis Project then, with the help of diplomatic historians and political scientists, established an interval scale of cooperation-conflict event-categories. Scalers were then trained to rate the events in terms of conflict-cooperation scores. Extremely high interscaler reliabilities were achieved, ranging over .9 correlation. (These were established by pair comparisons of scale scores using the Pearson,

1. While Bismarck, of course, became German Chancellor in 1862, the aphorism "Bismarckian system" does not become appropriate until after 1870 with the Prussian defeat of France and the consolidation of the German Empire.

Spearman, and Kendall correlation indices.) These events thus provide the dependent variable of cooperative or conflictual outcomes against which the independent variables of international theory can be tested. Utilizing the historian's measure of significance (and also a scale validated by diplomatic historians), 982 international events involving 23 nations have been recorded and scaled for this 11-year period. This is the data base against which balance of power propositions will be tested in the sections which follow.

Propositions To Be Tested

In recent years, the general notions of balance of power have been refined and narrowed into empirically testable propositions. These propositions, authored by Arthur Lee Burns, Morton A. Kaplan, David Singer and Melvin Small, F. H. Hinsley, and Richard Rosecrance have recently been joined by a number of structural balance hypotheses, stemming from the works of Heider, Harary, Taylor, and others. In this paper, it is our intention to review these propositions to see which are most clearly validated by the data generated in the Situational Analysis Project at Berkeley and Cornell. The propositions may be stated as follows:

Proposition 1. "The closer the alliance between any two or more powers, the greater the increase of opposition or 'pressure' (other things being equal) between any one of the two and any third Power or group of Powers" (Burns, 1957: 497).

Proposition 2. In a balance of power system states "act to oppose any single actor which tends to assume a position of predominance with respect to the rest of the system" (Kaplan, 1957: 23, rule 4).

Proposition 3. In a balance of power system, states "act to oppose any coalition which tends to assume a position of predominance with respect to the rest of the system" (Kaplan, 1957: 23, rule 4).

Proposition 4. In a balance of power system, states "permit defeated or constrained national actors to reenter the system as acceptable role partners, or act to bring some previously inessential actor within the essential actor classification" (Kaplan, 1957: 23, rule 6).

Proposition 5. The formation of a significant alliance by two or more actors in a multipolar international system will, because of the loss of interaction opportunities, lead to a decrease in cooperation and an increase in conflict within the international system as a whole (Singer and Small, 1968: 249).

Proposition 6. Referring to the period after 1871:

(a) "the near equality of [Europe's] component states and the balance between them still remained" (Hinsley, 1963: 249).

(b) "The Bismarckian Concert marked a distinct system of international relations; it was not a return to the Balance of Power, but rather to its opposite. . . . The Bismarckian Concert differed from the Metternichean Concert also in that it was largely dominated by a single power and a single intellect" (Rosecrance, 1963: 147, 135).

Proposition 7. "The systematic structural balance approach . . . offers a clear approach to the study of international situations. One can draw a signed graph of a given state of events and examine it for balance. If it is balanced, there will be a tendency toward the status quo. If it is not balanced, one should examine each of the bonds between the pairs of nations in a cycle with regard to relative strength in the situation. One might then predict that the weakest such bond will change sign" (Harary, 1961: 178).

The Burns' Hypothesis

Burns' theoretical analysis of the international system focuses initially on that of the classic balance of power system of the nineteenth century. There is a balance of power international system if changes in relationships among two states affect a third nation. He illustrates the hypothesis with an economic analogy. Three firms are in competition with one another, Red, Yellow, and Blue, and each produces the same product. Blue and Yellow agree on a price-fixing policy. Red, therefore, suffers. In similar fashion, one can imagine an international system in which mutual arms reduction (alliance) between two powers places a third in a less-secure position. If two nations reduce their arms vis-à-vis each other, the newly created surplus of weapons and men is now available for use against the third power. The implication is that cooperation created by the alliance is offset by the conflict created between the allies and the third power or group of powers. This principle, if valid, would severely limit the possibilities of drastic conflict resolution in the system.

The empirical testing of such a proposition can be ideally accomplished within the compass of the situational analysis data. The decade 1870-181 offers at least two major examples of alliance cooperation, the effects of which can be observed on the rest of the international system: the Three Emperors' League of 1873 and the Dual Alliance of 1879. In the first case, the three eastern courts cemented their friendship in a pact that was largely directed against France. In the second, Austria and Germany created a strong defensive alliance that was directly aimed at Russia. If

Burns is correct, then the data should show an increase in cooperation among allies (consequent upon alliance) and an increase in conflict between the allies and the rest of the system.

A close analysis of the aggregate data of international conflict and cooperation, however, shows that Burns' propositions are not fully sustained. In Table 1, we summarize the levels of cooperation and conflict before and after the Three Emperors' League.

As one can note by inspection, the Three Emperors' League did not increase the level of cooperation among allies. This is especially true with respect to Germany, which is the target of a severe increase in hostility directed at her by her own allies (−12.29 from Russia and −9.61 from Austria). Of the six possible relationships among the allies all but one show a marked decrease in cooperation *after* the alliance. Burns' hypothesis does correctly predict a decrease in cooperation between the new coalition and the other members of the system, but this decrease is much less than decreases within the coalition itself. Indeed, since both trends are in a conflictual direction, the notion of a constant-sum of cooperation in the system cannot be accepted. The pressure or opposition created in the wake

TABLE 1
INTERNATIONAL INTERACTION BEFORE AND AFTER THE ESTABLISHMENT OF THE THREE EMPERORS' LEAGUE, OCTOBER 1873.[a]

Actor-Target	*Period I*[b]	*Period II*[b]	*Change*
Germany-Russia	59.08	54.49	−4.59
Germany-Austria	54.77	52.80	−1.97
Russia-Germany	59.89	47.60	−12.29
Austria-Germany	57.41	47.80	−9.61
Austria-Russia	54.18	56.39	+2.21
Russia-Austria	61.37	57.10	−4.27
Germany, Russia and Austria-rest of system	53.08	50.87	−2.21

a. In the table above, as in all others in the rest of this article, scores over 50 indicate cooperative balances; scores below 50 indicate conflictual balances in a scale ranging from 0 to 100. That is, 0 is perfect conflict and 100 is perfect cooperation.

b. The time periods were chosen to demarcate between important systemic changes and thus provide homogeneous time periods. Systemic changes were taken to be wars and alliances. It is expected that changes in cooperative-conflictual scores due to alliance formation would occur in homogeneous time periods immediately following consummation of the alliance. Thus, Period I gives the cooperative balances for the 30-month period prior to the Three Emperors' League beginning from the end of the Franco-Prussian War; Period II gives the balances for the 22-month period immediately following the establishment of that alliance through the war scare crisis.

of alliance formation is not directed against the rest of the system; rather, it is internalized with two of the allies directing their hostility at a third.

Six years later, Austria and Germany joined forces against Russia in the Dual Alliance of 1879. Again, Burns' concepts of pressure and opposition fail to describe the realities of the historical balance of power. The Austro-German Alliance was a significant military alliance, the foundation of the Bismarckian system. Yet contrary to the predictions of Burns' hypothesis, the alliance is followed by a period in which the relations between the two signatories deteriorate substantially while the relations between each signatory and the target nation, Russia, improve substantially. Table 2 charts cooperation-conflictual balances in the months between the Congress of Berlin and the Dual Alliance, and the months between the Dual Alliance and the Three Emperors' Alliance of June 1881. Prior to the Dual Alliance, relations between Germany and Austria are closer than they are after the conclusion of the alliance. Relations between the two and Russia are far more hostile before the alliance is formed than after. Actually, of course, Bismarck used the alliance with Austria to draw a previously disgruntled Russia closer to the Berlin Court. Eventually, Russia joined the Three Emperors' Alliance, and system conflict greatly decreased.

Therefore, both the Three Emperors' League of 1873 and the Austro-German Alliance of 1879 indicate that alliances do not automatically lead to an increase of conflict elsewhere in the system, nor do they necessarily produce enhanced cooperation among their members. Burns' formulations do not take sufficient account of the degrees to which both conflict and cooperation may be separately increased in the international system.

TABLE 2
INTERNATIONAL INTERACTION BEFORE AND AFTER THE SIGNING OF THE AUSTRO-GERMAN ALLIANCE OF OCTOBER 1879

Actor-Target	*Period V*	*Period VI*	*Change*
Germany-Austria	58.96	54.54	−4.42
Austria-Germany	60.65	56.74	−3.91
Germany-Russia	49.79	54.74	+4.95
Russia-Germany	51.69	59.74	+8.05
Austria-Russia	46.67	53.28	+6.61
Russia-Austria	52.26	58.60	+6.34
Germany and Austria-rest of system	50.87	52.64	+1.77

Kaplan's Central Hypotheses

Kaplan does not make clear whether his propositions are empirical generalizations or rules he thinks governments would follow if they were rational. He alternates between description and prescription. He does state, in a number of places, that his "balance of power" system has had historical counterparts. He specifically mentions the nineteenth century and states that "the term 'balance of power' makes intuitive sense if it is applied to the description of the international system that persisted throughout the eighteenth and nineteenth centuries" (Kaplan, 1957: 22). Furthermore, after listing his six rules of the balance of power system, he gives examples for each rule, many of them taken from the Bismarckian period. Thus, we will treat the rules as empirical generalizations and test them with our data.

If the amount of cooperation in a system is far from being a constant quantity, it is even more important to investigate what is perhaps the most central formulation of all balance of power notions: namely, that states tend to oppose a single actor (proposition 2) or a coalition (proposition 3) that tends to assume a position of predominance with respect to the rest of the system. Note, however, that the term predominance should not be defined too narrowly so as to imply that attempts to gain predominance are a rare phenomenon. Certainly a war or a war-threat period is one in which this hypothesis can be tested, because the members of the system can never be sure that victors will not seek to capitalize upon their victory. During such periods, the expected victor—and later, the victor—may be tempted to seek such predominance.

The Situational Analysis Project data offer three historical cases for evaluating the usefulness of proposition 2: the Franco-Prussian War, the War Scare of 1875, and the Russo-Turkish War of 1877.

During the period before the Franco-Prussian War and during the war until the Battle of Sedan, the European powers expected France to win.[2] During this period, Austria, Russia, and Britain were friendly to France. Furthermore, Russia and Austria were hostile to Germany. After the news of the decisive German victory at Sedan, however, the alignment pattern switched and all nations became cooperative toward Germany. This result certainly does not follow from the prescription of this hypothesis. Given Kaplan's proposition, one would have expected the nations at first to side with Germany in order to deter France, the expected victor. Then,

2. See Appendix for a description of the time periods.

following the decisive German victories, one would expect the nations in this classic balance of power system to rally to France in order to prevent the potentially unsettling humiliation of a central actor. Rather, one finds an "ingratiation effect." This is most marked in the case of Austria, which had been quite hostile to Germany since the time of her defeat by the Prussians in 1866. The Austrian switch is most remarkable. Austria is cooperative with France and hostile to Germany until Sedan, and then after Sedan she becomes hostile toward France and cooperative with Germany. In fact, this new friendliness toward Germany on the part of the Austrians and also the Russians continues and leads to the establishment of the Three Emperors' League in 1873.

During the War Scare Crisis of 1875, there does seem to be some exemplification of Kaplan's principle in operation. But it is not fully clear that this is so. The opposition to Germany does not occur in a context where Germany is actually fighting France; therefore, this is the phenomenon of a "costless" balance of power in operation. Neither Austria nor Russia is actually being asked to do anything militarily to support France. This was not so during the latter stages of the Franco-Prussian War. Then, the only useful way in which France could have been supported against Prussia was through military action. In this sense, the stakes were much higher in the war than in the war scare.

The Russo-Turkish War of 1877, like the War Scare Crisis, superficially bears out Kaplan's hypothesis. But a deeper analysis uncovers qualifications which are particularly important and need to be underscored. First, the war was between a major and a minor power, and thus no great strength was to be gained by Russia which might be used to threaten the stability of the system. Second, Russia was relatively weak, and due to her difficulties at Plevna, barely defeated Turkey. Third, had Russia defeated Turkey soundly, it is possible that the other powers would not have intervened at the Congress of Berlin to take the fruits of victory away from Russia. What we have here is an example of a major actor winning a war and being restrained in its victory by the other members of the balance of power system. A closer analysis reveals the fact that the other members acted without risk since Russia had clearly demonstrated her weaknesses. It is just as easy to assume that, if Russia had been stronger and had won decisively, the ingratiation effect would have been operative. The members of the system might have joined the Tsarist bandwagon as they had joined Bismarck's after the Franco-Prussian War. The general conclusion should be that, though some empirical cases bear out parts of Kaplan's proposition, it does not hold generally. It may even be true that

it only holds for the less weighty, less significant cases. If so, this is a major restriction on its generality and usefulness.

If it is not certain that states strive to resist a state which is seeking predominance in the system, it is no more certain that states uniformly resist a coalition which may entertain the same objectives. The Three Emperors' League of 1873 is not a fair test of Kaplan's proposition because the coalition is too short-lived to be in a position to seek any sort of predominance in the system. The Dual Alliance of 1879, which linked Germany and Austria in a defensive pact lasting until World War I, is definitely the stereotype of an anti-balancing alliance. What is significant here is that this alliance does not create any evident opposition whatsoever in terms of counterweight or countercoalition. A comparison of the period before the alliance (Period V) and the period following the alliance and leading to the Three Emperors' Alliance (Period VI) shows that Germany experiences a rise in the amount of cooperation it receives, and Austria receives roughly the same. In fact, during the latter period, Austria and Germany are the targets of the most cooperation from the other powers. Most remarkably, Russia, the stated target of the Dual Alliance, rather than showing increased hostility to the alliance pair and seeking friends elsewhere, becomes more cooperative to the new coalition and is brought into the arrangement in 1881. Again, an ingratiation effect is evident. The other system members rush to make their peace with this central combination, rather than in any sense opposing it.

France displays strong anti-balancing behavior during this decade by not seeking coalition partners elsewhere in the system. Indeed, France is less cooperative to the two possible counterweights, Russia and Britain, in the period after the alliance than in the time before the alliance. Clearly, there is no movement by nonmembers of the coalition to cooperate more with other nonmembers nor any hostility directed toward the alliance.

If one looks beyond the 1881 period, one finds even more evidence that Kaplan's proposition cannot be accepted. Germany eventually succeeds in bringing Italy, England, and Spain into a dominant coalition that leaves France totally isolated. This kind of centripetal movement is in direct contradiction to the type of centrifugal movement implied by Kaplan's balance of power hypothesis.

Kaplan's final proposition requires that a defeated actor be returned to the system or be replaced by a new essential actor. During the period under discussion, there was one major-power war, the Franco-Prussian War of 1870, in which France was the decisive loser. It is instructive to look at France's role in the system following that defeat. In the period

immediately following the war (Period I), France is the smallest actor in terms of number of actions initiated, the smallest target in terms of actions received, and the target of the least amount of five-power cooperation. In the next time period (Period II), the War Scare Crisis, France becomes a major actor and target. During this period, France exhibits hostility toward Germany and cooperation toward the powers whose assistance she desired. As a target, she receives hostility from Germany and cooperation from the others. For the rest of this decade (Periods III-VI), France is the target of the least amount of action by others, and she herself initiates less action than all other powers. Table 3 shows clearly the magnitude of French isolation. Over the entire decade, France initiated only eight percent of the actions and was target of only fourteen percent (the smallest figures for any of the five powers). If one excludes the war scare period, the one period of French activity, France is seen as the actor six percent and target eleven percent. In the period immediately following the war, French isolation is most apparent: actor four percent, target six percent.

These figures show clearly the isolation of France from the system and her degree of nonparticipation. Even more interesting is the fact that the time period of greatest French isolation (Period I) right after the war, is also the most cooperative of the six periods (five-power systemic cooperation; Period I = 56.98). The war scare (Period II), a time of great French activity, is one of the more conflictual periods of the decade. Furthermore, this one period of French activity during the war scare is very similar to the periods in which Turkey appears as a major actor and target on the international scene. In both cases, their increased participation in the system seems to result from their being acted upon by others

TABLE 3
FRENCH ISOLATION

	n Events France as Actor	*Actor Percentage*	*n Events France as Target*	*Target Percentage*	*Total n of Events*
Period I (1st period after the war)	5	4%	7	6%	103
Periods I-VI (not including war scare)	82	6%	149	11%	1,250
Periods I-VI (entire decade)	122	8%	206	14%	1,413

(big power demands on Turkey, German hostility toward France) rather than by their own initiation. Therefore, we may conclude that, in contrast to Kaplan's proposition, during the decade following the Franco-Prussian War the international system experienced a de facto decrease in the number of essential actors. There appeared to be no desire to raise French status nor to offer her position to a more deserving nation. The remaining actors seemed oblivious to any anti-balancing effects incurred by the demise of French major-power-diplomacy.

The Alliance Aggregation Hypothesis

Balance of power, alliance formation, and general system dynamics have also been the focus of empirically based studies. The research of J. David Singer and Melvin Small (1968, 1966) offers the most notable example. In a very ambitious project, they focus on alliance aggregation, a structural variable at the systemic level of analysis, as a predictor of war. Singer and Small (1968: 251) test the hypotheses that (1) "the greater the number of alliance commitments in the system, the more war the system will experience," and (2) "the closer to pure bipolarity the system is, the more war it will experience." They operationalize their dependent variable, "more war," by using five measures of conflict and operationalize their independent variable by employing seven measures of alliance aggregation. For the two centuries under analysis, their findings are ambivalent. They find high positive correlations between alliances and war in the twentieth century and consistent negative correlations in the nineteenth century. Singer and Small make an exemplary effort at establishing a sound methodological framework for a common and often imprecise argument found in the balance of power literature. The conceptual inconsistencies of this argument and others like it are indicated by Dina A. Zinnes (1967). Although she misinterprets and overstates the assumptions of the Singer and Small project, she does offer some positive suggestions for research in testing balance of power hypotheses.

Singer and Small (1968: 249) discuss what they believe is generally assumed to be the underlying mechanism existing in a balance of power system.

> Central to this notion is the understanding that the invisible or unseen hand will function only to the extent that all nations are free to deal and interact with all others as their national interests dictate. Thus, it is assumed that every dyadic relationship will be a mixture of the cooperative and the conflictual,

> with political, economic, ideological and other issues all producing different interest configurations for each possible pair of nations. The net effect, it is believed, is such a welter of cross-cutting ties and such a shifting of friendships and hostilities that no single set of interests can create a self-aggravating and self-reinforcing division or cleavage among the nations. . . . It follows from this sort of model that anything which restrains or inhibits free or vigorous pursuit of the separate national interests will limit the efficacy of the stabilizing mechanism. And among those arrangements seen as most likely to so inhibit that pursuit are normal alliances. . . . If each alliance commitment reduces to some degree, the normal interaction opportunities available to the total system, and the loss of such interaction opportunities is supposed to inhibit the efficacy of the balance-of-power mechanism, we should find that as the system's interaction opportunities diminish, war will increase in frequency, magnitude, or severity.

Singer, in an earlier essay with Karl Deutsch (1964) elaborates on the concept of interaction opportunity which stems from the formula for possible pairs, $N(N-1)/2$. In his project with Small, he tests whether a decrease in N (i.e., uncommitted nations) due to alliance formation prevents the successful operation of cross-pressures on nations. These cross-pressures are assumed to ward off war. These assumptions form a tenuous chain: the greater the percentage of uncommitted nations, the greater the interaction opportunities, the greater the cross-pressures, and, therefore, the greater the chance for peace. These linked propositions, if validated, have tremendous significance for the study of conflict and cooperation patterns in international relations. Therefore, from Singer, Small, and Deutsch comes a specific hypothesis concerning cooperative and conflictual patterns modified by alliance formation which can be tested by our data.

> Proposition 5. The formation of a significant alliance by two or more actors in a multipolar international system will, because of the loss of interaction opportunities, lead to a decrease in cooperation and in increase in conflict within the international system as a whole.

Again analyzing the two alliances of the decade, we find evidence disputing this hypothesis. Surprisingly, alliance formation does not lead to an increase in interactions among allies. Table 4 shows that neither alliance is followed by a significant increase in percentage of intra-alliance interaction. In fact, the Three Emperors' League, which occurred at the end of Period I, was followed by a significant decline in percentage of intra-alliance interaction suggesting that interactions between the allies and the rest of the system *increased.*

TABLE 4
PERCENTAGE OF INTRA-ALLIANCE INTERACTION BEFORE AND AFTER THE THREE EMPERORS' LEAGUE AND THE AUSTRO-GERMAN ALLIANCE

	Period I	*Period II*	*Period III*	*Period IV*
Three Emperors' League				
Germany	71	18	42	43
Russia	61	45	34	18
Austria	75	50	39	40
Mean	69	37	37	33
		Period V	*Period VI*	
Austro-German Alliance				
Germany		27	26	
Austria		22	26	
Mean		25	26	

Not only does intra-alliance interaction fail to increase, but cooperation levels among the allies also decline substantially. Tables 1, 2, and 5 also show in most cases an increase in the ratio of conflictual to cooperative scores in systemic and intra-alliance interactions. The Austro-German Alliance of 1879, which Singer and Small rate as a Class I Defensive Pact requiring the highest degree of obligation, is a case where cooperation with the target nation increases while relations between Austria and Germany decline significantly. It appears that there exists no automatic increase in intra-alliance interaction or cooperation following an alliance, even the keystone alliance of the Bismarckian system.

What do alliances do to the international system with regard to overall levels of cooperation and conflict? Singer and Small would hypothesize that systemwide cooperation would decline following an important coalition of previously uncommitted nations. The evidence for this decade allows no such conclusion to be drawn. In fact, the data indicate that correlations between the formation of the two alliances and the decrease in cooperation would be very low or negative. As can be seen in Table 5, the alliances are followed by opposite changes in systemic levels of conflict.

Thus, when the alliances are taken in the historical context of their formation, the general hypotheses tested do not appear to be of value in explaining their impact in the period 1870-1881. It is debatable whether or not surgically extracting alliances and wars from their unique historical settings is the best way to explore the dynamics of the international

TABLE 5
SYSTEMIC AND MAJOR FIVE-POWER CENTRAL SYSTEM INTERACTION LEVELS BEFORE AND AFTER THE THREE EMPERORS' LEAGUE AND THE AUSTRO-GERMAN ALLIANCE

	Period I	*Period II*	*Change*
Three Emperors' League			
Systemic	55.87	50.40	−5.47
Major five-power central system	56.98	50.47	−6.51
	Period V	*Period VI*	*Change*
Austro-German Alliance			
Systemic	52.15	53.51	+1.35
Major five-power central system	55.09	56.17	+1.06

system. What is needed is a truly multivariate analysis employing data which consider major international events within the milieu of actual cooperative and conflictual patterns. The conclusions offered here must be qualified because the data, although presented in the historical context, still represent a limited time slice. When this data base is extended to include the four decades preceding World War I, the project can then be even more constructive in its evaluation of international relations theories.

Historical Interpretations of the International System

The propositions of Hinsley (1963) and Rosecrance (1963) are the result of the systemic analysis of diplomatic history. For the decade under discussion, these authors have offered contradictory systemic models. Hinsley characterizes the period as a traditional multipolar system; Rosecrance argues that the period is dominated by one nation and one personality, the newly formed German Empire led by Bismarck. Through an analysis of the data generated by the Situational Analysis Project, a third alternative to the question of polarity becomes evident. The overall pattern of conflict and cooperation among nations does not remain consistent throughout the decade. In fact, there is a fundamental reorientation of relationships during this period. The shift occurs dramatically with the convening of the Congress of Berlin, June 1878, to settle the Balkan Crisis.

The time periods before and after the Congress of Berlin provide startling contrasts. Germany until then was only one of five major European powers. Bismarck had initiated precisely one-fifth of the total number of international interactions for that time. More importantly, despite the Prussian victory over the French, Germany for the first eight years of the decade was in a position where she received considerably less cooperation than she gave out. From this rather unfavorable position, Bismarck brought Germany to the paramount position in the international system by the end of the decade. By taking charge of the diplomatic maneuverings during and after the Congress, and by acting as mediator between Russia and her opponents (especially Austria), Bismarck ensured that Berlin, not Paris, would be the diplomatic hub of Europe. Indeed, Germany doubled its role as initiator of international exchanges. By arranging the Dual Alliance and later the Three Emperors' Alliance, Bismarck began his systematic web of diplomatic entanglements which involved all the major and many secondary powers with the intentional exception of France.

The data for this decade, detailed into thousands of direct and indirect dyadic relationships, provide the subtlety necessary to distinguish between Hinsley's and Rosecrance's interpretations. The four time periods prior to the Congress show ample evidence that traditional nineteenth-century multipolarity was in flower. Five nations dominated the diplomatic scene, and no permanent alliances grouped any members into a threatening coalition. The initiation and reception of international interactions were, with the exception of the passive French government, equally shared. This was far from the case following the Congress of Berlin. During these two latter time periods, Rosecrance's description of a unipolar Bismarckian system is more accurate. The new Bismarckian Concert, keyed on a pattern of permanent defensive alliances, radically changed the flow of international interactions. Germany became the center of the system and benefited thereby. From a deficit position in cooperation received vis-à-vis cooperation extended (51.19 compared with 54.13), Germany emerged as the power with the greatest surplus of cooperation received (57.56 vis-à-vis 54.51) in the last two time periods.

Surprisingly enough, one can conclude that Hinsley and Rosecrance erred in their delineation of historical periods. Despite their close analysis of the diplomatic events of this formative period of modern European history, they blanketed this decade with a systemic description which did not hold true for the entire era. Classic multipolarity was waning; Bismarckian unipolarity was ascending. The decade was, in short,

transitional. The next several sections explore methods and hypotheses designed to get at the heart of the structural dynamics of the international system by employing notions of psychological balance and tension through the framework of graph theoretical analysis.

The Structural Balance Model

Basic to the concept of balance of power is the notion that balance is both a rational and a stable state of being. Equilibrium is sought per se because it offers more comfort and less tension for the organism or group in which it resides. Psychologists offer numerous theories of attitude change which are based on the assumption that cognitive consistency or equilibrium is a motivating factor in behavior (Insko, 1967). The theory that is considered to have the widest range of applicability is balance theory or the theory of structural balance. Heider (1958, 1946) first formulated the postulates of this theory which focused on the tendency toward balance in a triadic relationship. Later Cartwright and Harary (1956) generalized the theory and expanded its applications through the use of directed graphs.

Numerous psychological experiments, pioneered by Morrissette (1958), have shown balance theory to be one of the outstanding developments in the field of social structure and attitude change.

The basic theorems of structural balance are quite simple. In fact, an Arab proverb goes right to the heart of the matter: "The friend of my friend is my friend, the friend of my enemy is my enemy, the enemy of my enemy is my friend." Any other cycle of relationships would be inconsistent or unbalanced. The following graphs illustrate the alternatives. The dotted lines represent negative (hostile) relationships; the solid lines are positive (friendly) relationships.

The two triads on the left (Figures 1 and 3) are balanced, while those on the right are not. These figures are called "signed graphs" because the interrelationships represented by the lines have been given a positive or a negative sign. The fundamental theorem of graph theory applicable here is that a signed graph is balanced if it has an *even* number of negative lines (or no negative lines). In a more complex graph, this theorem is expanded into the concept of clustering where the graph is balanced if and only if its points can be divided into two mutually exclusive sets of points so that the negative lines join only points in different sets and the positive lines join only points in the same set. For example, both of these signed graphs (pentads) are perfectly balanced (Flament, 1963: ch. 3).

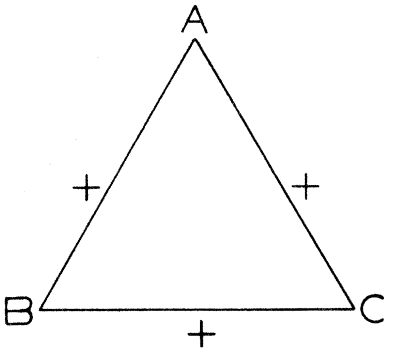


Figure 1

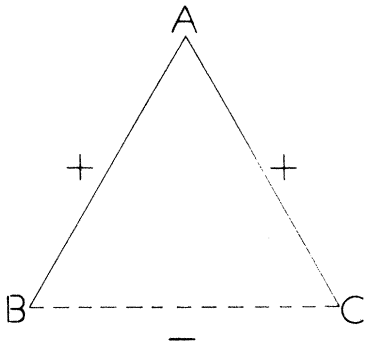


Figure 2

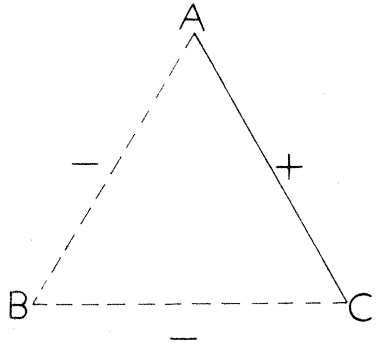


Figure 3

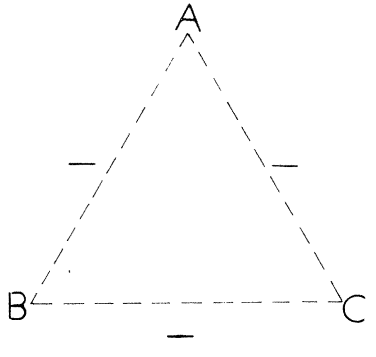
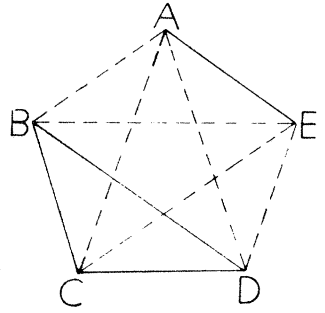
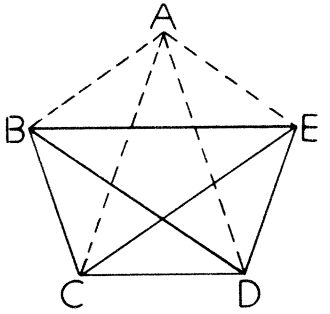


Figure 4



S_1 = A, E S_2 = B, C, D

Figure 5



S_1 = A S_2 = B, C, D, E

Figure 6

Every conceivable cycle, subset of the graph, is balanced; all possible triadic relationships are either +,+,+ or −,−,+. Degree of balance can be measured in several ways (Taylor, 1970). Most often it is determined by the formula advocated by Harary et al. (1956: 346):

$$\beta = \frac{b^+}{b}$$

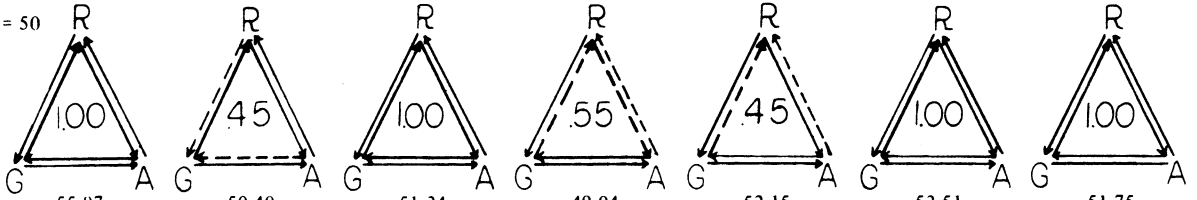
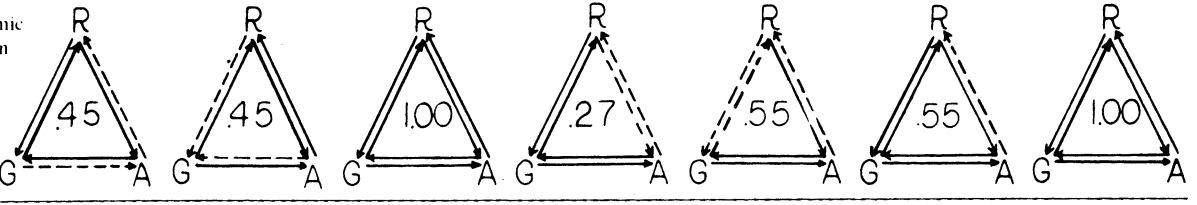
where β is the degree of balance, b^+ is the number of positive semicycles and b is the total number of semicycles in the signed graph. This ratio becomes especially significant when the two-way relationship between points is involved. In that case the graphs become quite complex and the degree of balance is far from obvious.

The theory of structural balance has been applied with success to many forms of interpersonal interaction, personal perception, intrapersonal stability (e.g., Freudian ego, id, and superego concepts), marital relations, and even to the dynamics of Shakespearean drama. It is not surprising then that the international system should be a subject for analysis. While international relations theorists have long been discussing equilibrium and balance of power theories, they have, with only two notable exceptions, completely passed over the structural balance literature of social psychology and mathematics. Frank Harary (1961), following a suggestion by Anatol Rapoport, undertook a structural analysis of the Middle East Crisis of 1956. Although Harary is an expert in structural theory, he had no objective data from which to determine which interactions were positive and which were negative. While Harary did acknowledge the limitations of his research, he did not offer solutions to the problems of finding adequate data.

It was nearly a decade later before Harary's pioneering proposals led to any further research. Patrick Doreian (1969), in a paper presented to the Peace Research Society at the 1968 Budapest Conference, not only made up for some of the more obvious inadequacies of Harary's study, but also applied the theory of structural balance to the 1967 Mid-East Crisis and, in a novel fashion, to a simulation of the Vietnam situation. Except for the data on the Vietnam simulation, Doreian was still faced with the problem of subjectively determining the nature of system interaction. Objective measures of conflict and cooperation patterns were a prerequisite to the successful application of structural balance theory to the international system. To a large degree, this obstacle has been removed for the decade

TABLE 6

INTERACTION PATTERNS WITHIN THE CENTRAL TRIAD OVER TIME[a]

	Time Periods						
Actor-Target	*I*	*II*	*III*	*IV*	*V*	*VI*	*I-VI*
G-R	59.08	54.49	55.17	49.23	49.79	54.74	53.54
R-A	61.37	57.10	58.26	48.02	52.26	58.60	55.87
A-G	57.41	47.80	59.11	58.11	60.65	56.74	57.64
G-A	54.77	52.80	57.54	55.54	58.96	54.54	56.49
A-R	54.18	56.37	56.80	45.85	46.67	53.28	51.83
R-G	59.89	47.60	52.35	53.95	51.69	59.74	53.60
Base = 50							
	55.87	50.40	51.34	49.04	52.15	53.51	51.75
Systemic Mean							

a. The signed graphs below each time period represent the structural schema for conflict and cooperation during that period. Base = 50 is an *absolute* measure of interaction levels using 50.00 as the dividing point. Systemic Mean is a *relative* measure of interaction levels using the mean cooperation and conflict level of all fifteen major and minor powers as the deciding factor in assigning positive or negative values to the lines in the directed graphs. The number inside each graph is β referred to above as the degree of balance for the triad (1.00 is perfect balance with all eleven semicycles in the triad balanced).

examined in the Situational Analysis Project. The remainder of this paper will summarize the findings generated by a conscientious application of the hypotheses borrowed from social psychology and mathematics (topology and graph theory) in counterpoint to the earlier sections on classical and empirical analysis.

The Application of Structural Balance Theory to the International System

The international system in the decade following the Franco-Prussian War can be viewed as centering on the relations among the three great empires of Germany, Austria-Hungary, and Russia. This decade is characterized by the rise, demise, and rebirth of the Three Emperors' Alliance.

The ultimate question to be answered is what can the theory of structural balance tell us about this period which could not be ascertained from historical accounts or from traditional equilibrium theories about the international system. The findings resulting from an application of the theory to the data of the Situational Analysis Project point to two kinds of insight:

(1) Micro-descriptive analysis of each time period specifying the exact levels of conflict and cooperation among nations; presenting the overall degree of balance for the system at each time period; the degree of balance for each nation at each point in time; implications as to the areas of tension, both absolute and relative, within the system (or within any particular triad).

(2) The dynamics of the system; measures of the amount of change in conflict and cooperation patterns within the system over time; the relationships most prone to change; dyadic, triadic, and pentadic patterns of change; variables which are general predictors of change in interaction patterns.

Table 6 offers the interaction levels for the six actor-target pairs of the Three Emperors' Alliance over the six time periods.

(1) Micro-Descriptive Analysis

Without going into a detailed historical account of the decade, we can observe certain interaction patterns which add to our understanding of the period. The signed graph for Period I illustrates the cooperation existing among the three nations from the end of the Franco-Prussian War through the negotiations preceding the Three Emperors' League and to the

completion of that alliance. The absolute measure of interaction (base = 50) shows the triad in total balance. However, compared to the high level of systemic cooperation, the German-Austrian relations were far from reciprocally equal; similarly, Germany was not offering Austria the same support it was receiving and far less cooperation than she was extending to Russia. There were undercurrents of conflict among the three even before the signing of the alliance.

Period II, as noted previously, presents a drastic change in relationships. During the War Scare Crisis which dominates this period, Germany's two allies dramatically turn against her. R-G and G-A drop significantly, although G-A and G-R remain positive. The relative and absolute levels almost coincide as systemwide cooperation declines from 55.87 to 50.40. Austria improves relations with her ally Russia and the directed graphs of absolute and relative interactions are identical. The degree of balance has dropped absolutely from 1.00 to .45, implying that this confused state of unbalanced dyadic and triadic relationships is not likely to last long. Either Germany will change her G-A, G-R negatively or the crisis will pass and R-G and A-G will again be positive.

The latter is what in fact happens. In Time Period III (from the end of the War Scare Crisis to just before the outbreak of the Russo-Turkish War), the Three Emperors' League is functioning soundly. Interaction levels among the three are quite a bit higher than either base 50 or the systemic mean. This is the longest, most stable period in terms of allied cooperation.

Period IV, covering the Russo-Turkish War up until the Congress of Berlin, witnesses the disintegration of the alliance in word and deed. Germany and Austria turn against Russia rather than support her in her time of struggle. Russia reciprocates Austria's hostility, but she clings to her friendly relations with Bismarck and increases the amount of cooperation directed toward Germany. This alone prevents the graph of Period IV, base 50 from being perfectly balanced with Russia isolated by negative lines from the G-A coalition. The systemic graph of this period shows that, although Bismarck decreased his support for Russia by about ten percent, G-R does remain above the systemic level of interaction. Therefore, the graph shows relative balance to be extremely low. The systemic mean, Period IV graph is totally unbalanced except for the three dyadic pairs. Bismarck cannot be an ally of both Austria and Russia while they are so hostile; likewise, the Tsar cannot trust Bismarck while he is so close to Austria; Austria must also feel tense about Germany's support of Russian moves in the Balkans. This confusion is upsetting; either Russia

must be excluded totally from the Austro-German coalition or she must be a part of it. In fact, both alternatives were contemplated and attempted.

During the period surrounding the negotiations for the Austro-German Defensive Pact of 1879 (Period V), both Germany and Austria were hostile toward Russia and were highly cooperative in their mutual relations. There was great pressure on Russia to reciprocate this hostility and to break away from the two German-speaking empires. If Russia had changed her output of cooperation toward Germany and Austria, the result would have been a situation of perfect balance (as shown in Figure 7), which would imply no tension or pressure for change. Russia decided against such an isolationist policy and in Period V increased her cooperation with Austria and kept her interaction with Germany on the positive side of the scale. Thus, she was in an excellent position to rejoin the alliance in Period VI following the settlement of most of the conflicting issues with Austria which had grown out of the Balkan Crises. As noted earlier, after the Austro-German Alliance is signed, Russia is drawn toward the allies and openly seeks to join them. To this end, Russia dramatically increases her cooperation. Although Germany and Austria reciprocate, they end up being the target of higher levels of Russian cooperation than they initiate toward Russia. The decade in question ends with the signing of the Three Emperors' Alliance in June 1881. The overall totals show perfect balance, but this does not point out the real pressures placed first on Germany during the War Scare Crisis (Period II) and later on Russia following the Russo-Turkish War (Period IV). More detailed analysis shows that, during the War Scare Crisis, Germany was in the least number of balanced relationships as actor, and, likewise, following the Russo-Turkish War, Russia was in only three balanced relationships out of a possible ten.

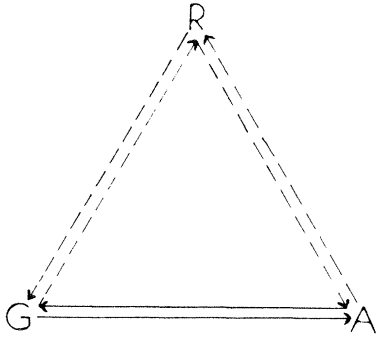


Figure 7

It is also important to note that, since the period was peaceful with regard to the relations among the three, there was pressure on negative relations to become positive in seeking balance rather than for positive relations to become negative in the search for balance. This is illustrated by the fact that both Germany and Russia, when they were the target of negative relations, opted to remain cooperative rather than to reciprocate with conflictual initiatives. Russia and Germany sought balance, as in Figure 8, rather than as in Figure 9.

This trend can be clearly observed in Table 6, where every negative relationship experiences a positive shift in the time period following. Imbalance was resolved by cooperation rather than by conflict in this decade.

(2) The Dynamics of the International System

Structural theory offers an excellent opportunity to observe changes in international relationships. For the first five time periods, we can observe which cycles remained the same and which changed direction in their conflictual and cooperative patterns. Considering both the base 50 graphs and the systemic mean graphs, there are 110 semicycles, including 30 dyads and 80 triads. At this point, it is useful to bring in Proposition 7, a concept considered important by Harary (1961) in his early work on structural models in the international system. Harary hypothesized that, in addition to balance, the strength of the relationship would be very important. Specifically, he predicted that, of the unbalanced relationships, those which were also weak would be more likely to change signs. With the data available, this hypothesis is quite easy to operationalize. Again using base 50 and the systemic mean, the six-actor target relationships in our

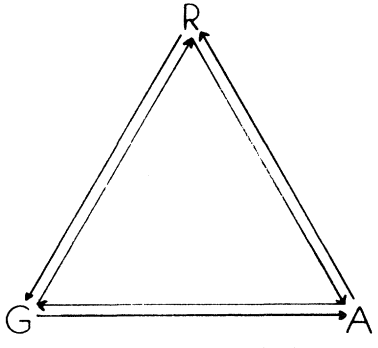


Figure 8

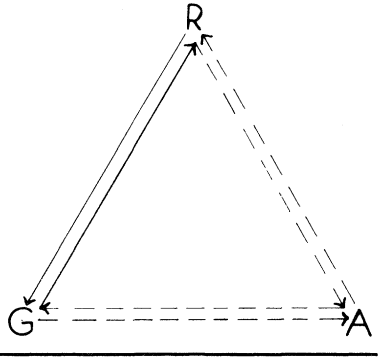


Figure 9

triad can be dichotomized into the three weakest and the three strongest. Strength of bond does prove important since, for the 10 graphs, there were 23 changes in bonds. Seventeen of them were weak bonds; only 6 involved strong bonds changing. Balance likewise was an important factor. Of the 9 unbalanced dyads, 7 changed (78%) while only 45% of the balanced dyads (9 out of 20) changed.

Combining these two variables, balance and strength of bond, we get a good view of the dynamics of the triad over the five time periods. Perhaps the most revealing observation is the fact that this decade of superficial stability underwent a great degree of change. Of the 110 semicycles, 59 underwent a change in balance in the following time period. The number of balanced cycles was 68 out of a possible 110 for a β of .62. Cycles dominated by weak bonds accounted for 58 of the total; strong bonds dominated the remaining 52. When strength and balance were combined, the dynamics of the triad came into clearer view. Table 7 summarizes these findings.

These findings support the hypothesis that unbalanced relationships are more likely to be unstable. The tension caused by the unbalanced relationship induces a change in interaction behavior. As Harary predicted, cycles dominated by weak bonds are more prone to change, but not quite as prone as are unbalanced cycles. Combining these factors strengthens their impact. The two extremes, unbalanced-weak cycles and balanced-strong cycles, contain the most cases, 70 of 110. As hypothesized, unbalanced-weak cycles are highly volatile, while balanced-strong cycles are the most stable over time.

Enlarging our analysis to the pentadic level, we find more evidence for the imbalance → tension → change syndrome. Dyadic semicycles, the most

TABLE 7
STRUCTURAL BALANCE AND STABILITY

Kinds and Number of Semicycles		*Percentage Which Change*	*Percentage Unchanged*
Unbalanced cycles	(42)	74	26
Balanced cycles	(68)	40	60
Weak cycles	(58)	64	36
Strong cycles	(52)	40	60
Unbalanced-weak cycles	(30)	80	20
Unbalanced-strong cycles	(12)	58	42
Balanced-weak cycles	(28)	46	54
Balanced-strong cycles	(40)	35	65

fundamental relationship in the five-power system, provide the best possible test for the existence of change-producing tension. If a dyadic relationship is unbalanced, it signifies that nation X is friendly to Y while Y is hostile to X. Throughout the decade under examination, only 20% of the dyadic relationships were unbalanced. Of these, 90% reverted to perfect balance in the next time period. This basic tension-producing relationship appears most conducive to rapid change.

These conclusions seem strongly to bear out the propositions of the balance theory approach. One cannot be sure, however, that the results are not partly an artifact of the selection of specific time periods against which balance theory would be tested. Thus, one is tempted to ask whether, if the larger time periods in the study were decomposed and analyzed, the same results would follow. The original time periods were chosen because they began and ended with events that had systemwide political significance (e.g., war, crisis, and international agreement). These events not only separate comparatively heterogeneous eras, they also delineate homogeneous periods.

To test whether the theory of structural balance works within as well as across historical periods, two time periods were chosen for more intensive microscopic examination. The first of these lasted from the War Scare Crisis to the beginning of the Russo-Turkish War; the second, from the Congress of Berlin to the Three Emperors' Alliance. Both periods are relatively long and contain a large population of events. Both moreover offer difficult testing grounds for balance theory because of their heterogeneity. Two methods were chosen for investigating the intraperiod workings of the balance hypothesis. First, each period was divided by time into two and then three subsections; second, each period was divided by number of events into two and then three subsections. The results were quite remarkable. Through *all* of these subdivisions, a constant pattern of relationships evolved. The five major nations began each period in imbalance and rearranged their relationships so that in each concluding subsection they had achieved perfect systemic balance. Therefore, in terms of structural balance theory, international relations *within* periods as well as *between* them appears to adhere very closely to the imbalance-tension-change syndrome.

Conclusion

In summation, the main contribution of the theory of structural balance is that it introduces experimentally proven hypotheses of attitude

consistency to the study of the international system. In addition, it provides the kind of micro-theory that magnifies the details of international behavior to the degree where more subtle differentiation in description and analysis is possible. If one simply labels the decade under study here as a stable, multipolar balance of power system, this tells little about the dynamics of the period. However, by using measures of imbalance and tension coupled with the intricacies of two-way directed graphs, the actual changes in interaction patterns begin to come into focus and become comprehensible.

Many suggestions could be made for improving the soundness of this approach to the reality of international balance dynamics. Perhaps the areas most in need of research concern tension and intensity. The subject of tension in attitude, leading to change in behavior is a very complicated matter. Howard F. Taylor (1970) has been conducting experiments in the mechanism of this process. More must be known about this key area of balance theory before better prediction of change is possible.

The Situational Analysis Project data are also capable of measurement for interaction intensity. When this evidence becomes available, another dimension will be added to the examination of interactive patterns. With intensity measures, the signed graphs will show more than positive or negative values of unit proportions. The signs could have ranges perhaps from +5 to −5 along a Likert-type scale of intensity. Much more could be done to improve the value and soundness of structural balance theory.

Further, there is an entire body of literature dealing with the theory of coalition formation which appears to be conducive to integration with the theory of structural balance. The works of W. H. Riker, T. Caplow, W. A. Gamson, and J. M. Chertkoff, to name a few, are along lines similar to those proposed here. Dina Zinnes (1970) has proposed linking the allied fields of coalition theory and balance of power theory. We suggest the inclusion of structural balance as a further step in exploring the possible application of psychological and sociological methods to the study of the international system.

Given the results we have reached above, a careful observer of contemporary international politics would be wise to reconsider the tried and apparently untrue generalizations that have long passed for balance of power theory. The forecast for the international future offered by many students is that of burgeoning multipolarity (Deutsch and Singer, 1964; Rosecrance, 1966). But actors in world politics must not be led astray by propositions proclaiming automatic rules for the management of the system, any more than they should be made to believe in the "invisible hand" in economic matters. Decisions concerning peace and human

progress will be made with the help or hindrance of existing theory. We have the obligation to strive to improve it where we can.

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APPENDIX

TIME PERIODS, 1870-1881

Time Period	*Event Range*	*Start of Period*	*End of Period*
A	1-37	Jan. 12, 1870-Start of 1870	Sept. 2, 1870-Battle of Sedan
B	38-78	Sept. 12, 1870-After Battle of Sedan	May 1871-End of Franco-Prussian War
I	79-155	After May 1871-End of Franco-Prussian War	Oct. 22, 1873-Three Emperors' League
II	156-262	Nov. 1873-After Formation of Three Emperors' League	Aug. 1875-End of the War Scare Crisis
III	263-488	Aug. 5, 1875-After the War Scare Period	April 16, 1877-up to Outbreak Russo-Turkish War
IV	489-650	April 24, 1877-Outbreak Russo-Turkish War	May 30, 1878-Convening of Congress of Berlin
V	650-829	June 3, 1878 Congress of Berlin	Oct. 7, 1879-Dual Alliance
VI	830-982	Oct. 13, 1879-Dual Alliance	June 18, 1881-Three Emperors' Alliance