One Causes, Beginnings and Predictions

The Power Transition

Despite the vast literature devoted to war, little is known on the subject that is of practical value. Theories about the origins of wars remain tentative. One need only recall the extraordinary exchange between German Chancellor von Bulow and his successor, in the early hours of World War I. "How did it happen?" asked von Bulow. "Ah, if we only knew," was the reply.[1] John F. Kennedy, recounting this episode many times, expressed horror at it. *He* would know; *he* would do better. Yet, even as he voiced his dismay, he was taking those very steps that led to American intervention in Vietnam. The record of ignorance is depressing.

Our interest lies in explaining major wars. Theories about why wars begin are in a highly embryonic state.[2] Attempts at solutions of the problem require the joining of information collected from two fundamental sources. In the first place, accurate observations are needed on the power possessed by all nations in the system. It has long been believed that the outbreak of major hostilities is connected to changes in the power structure of the international order. The core of this first argument is as follows: If one nation gains significantly in power, its improved position relative to that of other nations frightens them and induces them to try to reverse this gain by war. Or, vice versa, a nation gaining on an adversary will try to make its advantage permanent by reducing its opponent by force of arms. Either way, changes in power are considered *causae belli*.

It is also clear that "structural" changes can explain only a portion (though a critical portion) of the problem of why wars occur. What if the leaders of the nations affected do not perceive a threat in what has taken place and therefore do not choose to fight? There can be little doubt that some of the incendiary factors essential to the outbreak of wars are

lodged in the culture of elites, their belief systems, their skill in negotiation, their ability to decipher signals from other leaders, as well as in the constraints and opportunities imposed on and provided for all elites by the institutions in which they must operate. Our second source of information on the beginnings of wars is, then, the process whereby elites elect either to go to war or to keep the peace.

It is difficult to say which of these two types of information is more important. Intelligence agencies quarrel endlessly over the question of whether estimates of an adversary's capacities are more important than information on the intentions of its leaders. Clearly, neither estimates of a country's changes in power nor of the pugnacity of its elites can alone account for the entire process that leads one nation to war against another. But, taken together, perhaps they may enable us to answer two fundamental questions of international politics: What causes major powers to enter into major wars? Can one reliably predict the approach of wars?

For a long time, three models have been deployed in an effort to relate specifically different distributions of power to the coming of war or the preservation of peace, and to tie such estimates to assumptions as to when and why elites choose to fight. These models will serve as points of departure for our own analysis. We shall first explore in what ways the distribution of power is linked with the beginning of war. Second, we shall examine the problem of how to index decisions by elites to fight a war. Third, we shall try to test the models to see which one is correct.

Three Models

The Balance of Power

One model, respectably ancient, has served specialists and practitioners of international relations for centuries. The balance-of-power model suggests that when power is more or less equally distributed among great powers or members of major alliances peace will ensue. Conversely, as large asymmetries become discernible in the distribution of power resources, the probability of war increases markedly. Ac-

cording to this theory, the country whose power is increasing will take advantage of its superior strength to attack its now weaker adversaries. Hence, the trinity of beliefs that constitutes the balance-of-power model: equality of power is conducive to peace; an imbalance of power leads to war; the stronger party is the likely aggressor.[3]

> This is how the power system is supposed to work: . . . Given large numbers of nations with varying amounts of power each one striving to maximize its own power, there is a tendency of the entire system to be in balance. That is to say the various nations group themselves together in such a way that no single nation or group of nations is strong enough to overwhelm the others, for its power is balanced by that of some opposing group. As long as the balance can be maintained, there is peace and the independence of small nations is maintained.[4]

The quotation adumbrates the central mechanism on which the balance of power operates in determining either international stability or the outbreak of war. It describes the nature of the motivating force that impels the actors to arrange themselves in such a way that a balance of power may result, and it explains why at least a roughly equal distribution of power is necessary in order to keep the peace.

Just as theoretical economists explain the behavior of "economic man" as motivated by a desire to maximize his profits, so specialists in international politics who accept the balance-of-power model postulate the political motives of nations as motivated by their desire to maximize their power. The motive purportedly inspiring all actors in the system to behave as they do also implies the fundamental rule governing all decisions in the field of foreign policy. Since nations that have an advantage will maximize their power positions by attacking the weak, these weaker nations, in turn, will gain strength by allying themselves with other countries in comparable positions. All nations, of course, can also increase their strength by breaking up the alliances of their opponents, or even by fighting in order to protect the distribution of power that, in the long run, will protect their well-being and their existence.

It should be clear that the major mechanism through which the balance-of-power system is maintained is the making and unmaking of alliances. The reason for this dependence on coalitions in order to change the distribution of power is that the power resources of each member of the system are viewed as inelastic. There is no way a nation can increase its own strength very much except by adding its allies' strength to its own, or by decreasing its adversaries' strength by separating it, through persuasion, bribery, or subversion, from its allies.

Finally, the cited passage discloses why it is that the "balance" must represent an equal distribution of power. Proponents of the balance-of-power system often fudge on the question of what kind of power distribution is necessary to assure the security of all its members. Some writers have made the point that by a "balance" one means simply an equilibrium, and that such a state can result from almost *any* distribution of power.[5] But this, of course, contradicts the first commandment of the system, that all nations will try to maximize their power. Any gain of a decisive advantage by one nation or faction will represent the beginning of the pyramiding of power by the stronger until its hegemony is established or until, somehow, its power is matched by the equal power of its opponents.

One feature of the balance-of-power system needs additional comment: the system is homeostatic. Indeed, it is ultrastable. In maximizing their own power positions, nations group themselves in the kind of balances that tend to keep the system stable, peaceful, and secure. If the equilibrium is disturbed, the system favors adjustments that will return it to equilibrium. But if this jockeying process in which members of the system engage cannot reallocate the power loads sufficiently to obtain a roughly equal distribution among the major actors in the system, then one nation, possessing decisive strength and *uninvolved* in existing coalitions, will step in on the weaker side and redress the balance, thus rendering the system ultrastable. In the past, this role of balancer was associated with Great Britain, which is held by many historians to have acted in this fashion in Europe and the world at large, at least during the eighteenth and nineteenth centuries.

Those who espouse the balance-of-power model do not clearly explain why one nation should be exempt from the otherwise universal rule of wanting to take advantage of its superiority to expand its power at the expense of others. In view of the way all nations are supposed to behave, according to the rules of the model, it would not seem implausible to argue that a balancer, given its superior strength, would seek to maximize its power by attacking one coalition with the help of the other until it could reduce all other nations into submission. One cannot be quite comfortable with any other assumption.

Do all nations really wish to maximize their power? One cannot help noticing variations, over time, in the degree to which they have wished to do so. Sweden is a model of a peace-loving nation today, but it was once a feared aggressor. The United States was a peaceful, indeed an isolationist nation, in the past, but it certainly defies those definitions today. We lack, in short, the kind of universal behavior that would have to prevail for the first law of the balance-of-power system to be, as it is held to be, immutable. There are further uncertainties on this and other points. But to us the most important questions are those related to the validity of the model, and what must interest us most is whether or not the *equal* distribution of power does in fact, keep the peace; or, conversely, whether or not an *unequal* distribution of power produces war. The other two models argue against both of these possibilities.

Collective Security

A second model, based on the notion of collective security, gained both its name and its renown from its role in the formulation of the peace after World War I. Collective security presented a different set of power requirements for the maintenance of international peace. The distribution of power resources between opposing factions had to be extremely lopsided; collective security required that all members of the system move against the aggressor. "All against one" was the order of the day. If a peaceful nation failed to do its duty because of uninterest in the immediate quarrel or in the fate of the victim, or if an aggressor were able to win over potential defenders of the victim by playing on their

fears or on their greed for booty, the chances of war would grow with each such defection. Even a rough equality of resources among the members of the coalition defending the victim would fail to prevent war. But if the prescription of collective security, "all against one," were obeyed and war still came, the defeat of the aggressor would be inevitable. Collective security would provide security, if not peace. Thus, the fundamental tenets of this model are as follows. A lopsided distribution of power (with defenders much stronger than the aggressor) will support peace; an equal or approximately equal distribution of power will mean war, but the aggressor will be weaker than the coalition.[6]

This second model makes three additional assumptions. First, when a serious international dispute threatens an outbreak of hostilities, the identity of the aggressor will be clear to all. This seems very uncertain, however. There are many illustrations of one country's claiming another to be the aggressor, with every such accusation being widely credited. The wars in Vietnam, the conflict between India and Pakistan, and the recurrent struggles in the Middle East are cases in point of the difficulty of definitively identifying the aggressor.

A second assumption fundamental to the collective-security model is that all nations will be equally interested in preventing aggression and thus can be expected to regulate their political and military behavior to that end. While peace is the prized but largely unintended consequence of the ways in which the balance-of-power system works, in the collective-security system, peace is the direct and explicit aim of all its members (aside from the aggressor).[7]

A third assumption is that alliances are the major method by which the necessary imbalance of power between aggressive and peaceful nations is to be effected. In this, the collective-security and the balance-of-power models are as one. However, only in the former is the commitment to resist aggression made a priori: the necessary coalition is to follow automatically once the need arises.

The validity of some of these assumptions will be further discussed below. At this point, we should present a third model, developed since World War II, which has some ob-

vious differences from, and some important similarities with, the propositions of the two models already discussed.

The Power Transition

Our third model, evolved from the conception of the power transition, was formulated in the fifties.[8] Some of its conclusions are much the same as those we have just described: an even distribution of political, economic, and military capabilities between contending groups of nations is likely to increase the probability of war; peace is preserved best when there is an imbalance of national capabilities between disadvantaged and advantaged nations; the aggressor will come from a small group of dissatisfied strong countries; and it is the weaker, rather than the stronger, power that is most likely to be the aggressor.

The following passage summarizes the major mechanics of this model:

> At the very apex of the pyramid is the most powerful nation in the world, currently the United States, previously England, perhaps tomorrow Russia or China. . . . Just below the apex of the pyramid are the great powers. The difference between them and the dominant nation is to be found not only in their different abilities to influence the behavior of others, but also in the differential benefits they receive from the international order to which they belong. Great powers are, as their name indicates, very powerful nations, but they are less powerful than the dominant nation. . . . As we have seen . . . the powerful and dissatisfied nations are usually those that have grown to full power after the existing international order was fully established and the benefits already allocated. These parvenus had no share in the creation of the international order, and the dominant nation and its supporters are not usually willing to grant the newcomers more than a small part of the advantages they receive. . . . The challengers, for their part, are seeking to establish a new place for themselves in international society, a place to which they feel their increasing power entitles them. Often these nations have grown rapidly in power and expect to continue to grow. They have reason to believe that they can rival or sur-

pass in power the dominant nation, and they are unwilling to accept a subordinate position in international affairs when dominance would give them much greater benefits and privileges.[9]

This model insists that the significant differences in the distribution of international power are rooted in the different capacities of member states to utilize their own human and material resources. The model argues that the source of war is to be found in the differences in size and rates of growth of the members of the international system. If one introduces controls for size of nation-states—and differences here are truly spectacular—the rest of the differences in power can be accounted for by differences in levels of development of key sectors of national life. Most important are economic productivity and the efficiency of the political system in extracting and aggregating human and material resources into pools available for national purposes.[10]

The claim that national power stems from national development has important implications for the way this model works. It is often stressed that the development revolution is worldwide. And so it is. But the changes that make up development are not spread evenly across all countries and all regions of the world. Even today, only one-third of the earth's nations are developed and at the stage of power maturity. Roughly one-third are still developing and are at some lower point of the power transition. The remainder have barely begun the long trek toward wealth and power. What is particularly important for international peace and security is the fact that the big nations—those with the largest populations and, consequently, with the largest potential for power—are spread out along the development continuum. Some, like India or Indonesia, are extremely low on the economic scale and still in the stage of potential power; others, like China and Brazil, are at different points in the transitional stage; finally, such countries as the United States, Japan, Germany, the United Kingdom, and the Soviet Union are in various advanced degrees of power maturity.

It is obvious that capacity to disturb the equilibrium of the system is largely dependent on the base from which the

country begins. The full development of Guatemala, Costa Rica, or Albania will pass unnoticed, for these countries are small; but if India or Indonesia begins to modernize in earnest, the effects of such events will inevitably shake up the international power distributions. This is what happened when China began to evidence major gains in the accumulation of power resources. The power-transition model postulates that the speed with which modernization occurs in big countries is also quite important in disturbing the equilibrium that existed theretofore. For if development is slow, the problems arising from one nation's catching up with the dominant one may have a greater chance of being resolved. On the other hand, if growth takes place rapidly, both parties will be unprepared for the resulting shift. The challenger may not have had the opportunity to develop a realistic evaluation of its position because its elites will be strangers to power, and the sources of new-found strength are almost entirely the result of internal changes. It seems plausible to think that the chances for miscalculation consequently increase.

The developmental sequence should also be considered. It makes a difference to a nation's power whether development begins with a sharp rise in economic productivity, or with rapid political mobilization, or with dramatic increases in social and geographic mobility. Changes in these different sectors yield different power resources. Two examples will help to make this point clear. In most cases in the Western European experience, the powerful propellant of overall national development was economic change, and it was the steep rise in economic productivity in Western Europe in the nineteenth century that afforded the Europeans advantages in trade, weapons, and large armies and navies that enabled them to subjugate a backward world. However, in the case of some of the Communist countries, the motivation for national development has proved to be political mobilization and organization. The emergence of high levels of political mobilization, through the creation of political networks penetrating deeply into the mass of the population, has been largely independent of the socioeconomic changes that reinforced and propelled political changes in

the Western nations. The persuasiveness of Chinese ideology to peoples beyond China's frontiers and the astonishing effectiveness of Chinese, North Korean, Vietnamese, and Khmer Rouge armies against vastly superior forces are rooted in the success of political organization in those countries in mobilizing major fractions of their populations and creating the necessary structure to sustain a successful military effort. Political "development" in advance of economic development is a critical problem in the construction of measures capable of predicting the outcomes of wars and is given a complete airing in the next chapter.

The population of a nation, the speed, timing, and sequence of its political and socioeconomic development, have important consequences for the power of a country at any given time; all factors are critical to the operation of the power-transition model.

Comparison of the Three Models

The models differ in fundamental ways but also share a number of important features. To locate what we wish to know, we should ask three questions of each model. First, what rules the decisions of the actors in the system to keep the peace and to keep their places? Second, how are the power distributions essential for peace, and how do they bring about war? Third, and to us the most important, what are the power distributions that each model associates with peace or with the outbreak of major conflicts?

The Goals of Elites

It seems clear that the motives of decision-makers in maneuvering their nations away from or towards conflicts differ fundamentally in every model. In the balance-of-power model, the leaders of a nation seek to maximize its power. Strong nations try to expand, while their potential victims, seeking to protect themselves from aggression, band together to augment their offensive and defensive capabilities. Decision-makers in the collective-security system are moved by a rational desire to prevent (or to defeat) aggression.

The power-transition model differs from the other two in basic ways. It provides no general rule to explain and predict the circumstances in which elites will move toward war. On the other hand, it warns that changes in the power structure will not, in and of themselves, bring war about. Satisfied great powers are not likely to interpret advantages gained by satisfied lesser powers as threatening. Moreover, the powerful and satisfied do not start wars. Only if the great powers think that the changing system challenges their positions, or if they no longer like the way benefits are divided, should the shifts be deemed dangerous.

All three models, then, ascribe predictable behavior to nations. The first two models differ in that decision-makers are moved by a desire to maximize the utility of the system in the collective-security model, while in the balance-of-power model the motivations of the actors are to maximize individual utility, with the benefits accruing to the members of the system as a whole being simply a consequence of the selfish behavior of its members as individuals. The reader acquainted with the school of laissez-faire economics will, of course, find all this material most familiar. One should also note that both models assume that the currents leading to war and peace and to the preservation of the system are manipulable, that they can and must be managed, and that foreign-policy elites are key actors in the play. These are models suitable for the action-oriented.

According to the power-transition model, on the other hand, it is not a desire to maximize power or a single-minded urge to guarantee security in the narrow sense that leads nations to start major wars, though the latter is often the excuse furnished. In this model, it is a general dissatisfaction with its position in the system, and a desire to redraft the rules by which relations among nations work, that move a country to begin a major war.

We should note one point. The power-transition model does not require that the dissatisfaction felt by the challenger be judged valid by an "objective" observer. Dissatisfied powers may or may not have "good reason" for feeling aggrieved. While their positions may be somewhat disadvantageous when compared with those of a few other nations, their advantages over the rest of the world are substantial. Indeed, according to the model, the truly disadvantaged nations are by definition too weak to disturb the

peace. Valid or not, however, the choice of methods of the significant actors in the power-transition model remains predictable, and in this sense at least this model is at one with the other two.

A final point of difference needs to be cited. The trajectories that lead nations to collide with one another are not easily manipulable. Some fine-tuning of their movement is often tried, with very uncertain results. But the fundamental evolution of power distribution is set and cannot be manipulated. (The evidence of the consequences of war in Chapter 3 supports this view.) The power-transition model, therefore, may be of little comfort to activists interested in international engineering to preserve the peace.

The Mechanisms That Redistribute Power

What causes the pernicious distributions of power that lead to war? The models account for such power changes differently. The balance-of-power and collective-security models argue that changes are the results of alliances. The units of the system do not change (at least not much); they simply combine in different ways, and different distributions are the result of such combinations. The rule is simple: a nation can influence the balance of power in its own favor by allying itself with other nations and by adding to its own capabilities those of its allies. Other means are available if a nation wishes to improve its power position. It can also arm and even fight for this purpose, or redress its weaknesses. But the least costly and most certain way for a nation to improve its power position is to combine its strength with that of friends or to break the coalitions of adversaries. There is, it should be noted, substantial support for this view.[11]

The model based on the concept of the power transition is at odds with such conclusions because it assumes that the major source of power for a nation is its own socioeconomic and political development. How else can one explain the rise of the Soviet Union and the United States, or the decline of the United Kingdom and France? These major changes in the international distribution of power occurred

outside the normal pattern of alliances and have affected the stability and viability of the system far more than the alignments and realignments of coalitions. Most of the time alliances are simply not a realistic method of preventing threatening changes in the distribution of world power, given the skewness of relations between the great and the lesser nations, and also among the half-dozen great powers themselves. In times of peace, the dominant nation is substantially stronger than the remaining great powers. Consider the present worldwide distribution of power among the international giants from the angle of vision imposed by the power-transition model. The difference in power between the present leading nation, the United States, and its nearest challenger, the Soviet Union, is still very large, although the gap between them has been closing. And it is, precisely, the relationship between the challenger and the dominant country that, in the transition model, is likely to occasion a major war. Equally large is the interval separating the Soviet Union from Germany and Japan on the next tier of great powers, and finally, the gap separating those nations from France and the United Kingdom.

It is clear that, if the intervals separating the nations in question are as large as we suggest, more probable alliances could affect only the size of the intervals between the strata, but could not alter the fundamental ranking of the great powers dominating the international system.

Moreover, alliances cannot easily be made or unmade. For the six or seven nations that represent the major powers of the international system, there are a large number of possible but wildly implausible combinations. The plausible ones are very few; most are not plausible because, precisely, the socioeconomic and politico-ideological ties that bind nations together in the modern era resist yielding solely to considerations of power advantage. Witness how difficult it has been for the United States to consent even to diplomatic civilities with the People's Republic of China, or how difficult it was for Germany to change the nature of its relations with France, even though a French connection would have significantly improved German chances to outstrip Great Britain in the decades immediately preceding World War I.

The assumption that underlies much of the balance-of-power model, namely, that the dictates of power considerations are sufficiently strong to guide the behavior of countries in making and breaking alliances, is not true.

However, countries *do* change sides. For example, Italy and Japan moved from the side of the Allies to that of Germany between the two world wars and, together with Germany, changed sides once more after they were defeated in World War II. We can only guess at the complexities that play a role in such shifts. One can perhaps advance the notion that changes in alliances are connected with changes in the combinations of elites that have access to power in countries that change sides. Such changes are precipitated either by the socioeconomic and political shifts which occur as a result of the developmental process that all nations undergo once they begin to modernize, or are forced upon countries by defeats in major wars. The former cause was probably at work in Italy's change between the two wars and the latter in the passage of the Axis powers to the side of the Allies after World War II.

There are, however, some situations covered by the power-transition model in which alliances could make a difference in the power distribution of a system. But, as stated, such occasions are few, even though they could be of long duration. Obviously, if the intervals separating the great powers are very large and the units themselves are unchanging, there is virtually no possibility of the power rankings being altered. But according to the model of power transition, the units in the system are not immutable. National growth will cause a small number of major countries to overtake rivals who were far ahead of them at earlier points in time. The period of passage (which may require several decades) witnesses an equal distribution of power among the major contenders, with accompanying perils to peace. It is also a period when different alliances among major nations could effect a change in the distribution of international power.

Two examples will help make the point. There was a period in the last third of the nineteenth century when Germany had overtaken France and was catching up on Great

Britain; an alliance of the French and Germans during this period could have gained dominance for the latter, at least briefly. One may speculate about the future, in terms of the power-transition model, and foresee a relatively long period in which China will have surpassed the Soviet Union but not the United States, and when an alliance between the Russians and the Chinese could spell an earlier demise of American dominance in the international system than is currently anticipated. A solid alliance between the United States and the Soviet Union, on the other hand, would delay the moment at which China becomes the dominant power. These examples make it clear that, insofar as distributions of power are concerned, whether or not alliances should be considered as an important mechanism in the short-term redistribution of power in the system depends on the observer's interest in those periods when alliance behavior *can* affect such distributions. Alliances, however, cannot in the long run alter secular trends.

Power Distributions

The final and most critical difference one finds in comparing the three models appears when one asks what kind of power distribution is to be associated with the preservation of peace and the outbreak of hostilities. Here, the models divide differently than they do on the questions we have already discussed. To this question, the power-transition and collective-security models respond that, to preserve peace and security, the power distribution must be lopsided in favor of the defenders of the system and against the nations that wish to attack it. This is the very opposite of the prescriptions contained in the balance-of-power model. Its recipe for peace is an equal distribution of power between the major contesting sides, because the danger of war increases dramatically when one side begins to gain a substantial advantage over the other.

Moreover, balance-of-power predicts that the stronger will attack, collective-security posits that the aggressor will be weaker than the coalition, while power-transition argues that the attacker will be the weaker party.

One final point. In the case of the power-transition model,

there is a period during which both dominant and challenging nations are roughly equal in power. The challenger has finally caught up with the dominant country, passage is a reality, and the elites on both sides view the shifts in power as threatening. The model insists that it is an attempt to hasten this passage that leads the faster-growing nation to attack. At the same time it is a desperate attempt on the part of the still-dominant nation to intercept the challenger's progress that leads to war. Moreover, the passage may not be quick—it may take several decades—and the period may thus be punctuated by a number of armed conflicts. In addition, the model insists that attempts to arrest the gains of the faster-growing nation will fail. Whatever the fortunes of war, the challenger will probably "win" sooner or later.

Preparation for the Testing of a Model

It is clear from our discussion that in some ways these models are complementary and that in others they contradict one another. They can all be wrong, but they cannot all be right. Each of the models seems plausible enough, providing interesting explanations, for different circumstances and periods, of the way peace is maintained or war breaks out; but there is, so far, no way to tell which of the models is correct. And each of our explanations has its partisans. Which of the models describes accurately (or, at least, more accurately than the others) how the international political system works? The models are interesting one and all. But are they valid? We can never know, of course, unless we find some way of testing them, and this is precisely what we shall attempt to do here.[12]

We should be careful not to claim too much. The models cannot be tested in their entirety. They are far too complex and contain too many implicit and explicit propositions to be exhaustively examined here. Such a test would be a monumental work; indeed, it may not even be possible at this stage. What we wish to test is only one of the propositions contained in the models. The keystone of each of them is the distribution of power that it argues is associated with war and peace. In other words, what happens to the power distribution, at least among the great-power systems, when wars occur? It is this question that we shall try to answer.

Even such a test requires extensive preparation. The question "Which distribution of power leads to war?" inevitably involves a certain amount of conceptual looseness and ambiguity in its theoretical formulation that is no longer tolerable when one turns to the business of an empirical test. Things need to be clarified. How are we to measure national power or national capabilities? How are we to index the conception of power equality and inequality? Which wars are to be considered major?

Our first chore, therefore, if our tests are to be made possible, is to develop readily usable measures of national capabilities. This means, inter alia, that only measures for which data are available across time and major countries can be considered.

A second task is to define explictly the manner in which the changes in the distribution are to be indexed. If we argue that a certain type of relationship between the power possessed by each of two countries will lock the countries into a course that eventually leads to war, how is that specific configuration to be rendered explicit?

Our third task is to make clear which powers represent the actors in a given system. The matter, as we shall see, goes beyond simply defining which power is a "great" one. In any event, the identification of the actors constitutes a critical preparatory step before our experiment can be executed.

Fourth, we have to identify which wars the measured changes in power are supposed to explain. Clearly, the models do not pretend to explain all wars, although in the rarified atmosphere in which such ideas are discussed, it often appears that way. What they aim at explaining are major wars. It follows, then, that the problem is one of defining what constitutes a major war.

One final task remains. Implicitly or explicitly, all three models suggest that changes in the power distribution are not coded in the same way by different elites guiding major powers in their international dealings. A friend's power gains are not disturbing, but the newly won power of an

adversary may be seen by many as serious business. In some cases, it may be seen as *casus belli*. Thus we must have an acceptable measure for showing whether the elites of our national actors have interpreted the changes in the power structure preceding wars as not threatening and, therefore, as requiring no action; or whether, conversely, they have deemed them threatening and been spurred by them to gear their nations for war.

The Measurement of Power Resources

Power has long been considered to be the capacity of an individual, group, or nation to control the behavior of others in accordance with its own ends.[13] It is an element of every relationship, with each party in possession of resources, tangible and intangible, likely to alter the conduct of the other. Power becomes apparent only when a disagreement arises between the parties, in which case the desire of the more powerful will prevail. The measurement of power, therefore, is vital to the prediction and explanation of joint behavior.

There have been attempts to study the actual degree of control which one nation has exercised over another. For the most part, however, specialists in international politics have retreated to a fallback position and have contented themselves with measuring the resources that generate power.[14] This procedure presents problems. Power resources may not necessarily reflect the exercise of their potentialities, nor do reliable estimates of them include essential components (e.g., diplomatic skills, charismatic leadership, and internationally appealing belief systems) that are not susceptible to easy or dependable measurement. Moreover, hard estimates do not indicate the power a particular nation may ostensibly possess simply because other nations may mistakenly assume that it is more or less powerful than is actually the case. The semblance of power often passes for its reality.[15]

Because our concern is with the connection between power and war, the last problem may not loom so large. A discrepancy between the possession of real power and the external perception of it is more likely to occur in times of

peace than in wartime. During and after war, however, the two views tend to merge, for perceptions are then put to the test. Thus, Mussolini's threats and bluster won for Italy a degree of international deference which proved greatly out of proportion with that country's performance when its actual power was demonstrated in World War II, the period during which perceptions of Italian power came to collide with its reality. Similarly, the perception and the reality of Japanese military power were far apart until this country's gradual commitment in World War II brought the two together again.

Procedures for the measurement of national capabilities comprise three steps: (1) listing all the factors that may serve as indicators of what influences the exercise of national power; (2) selecting the number of such indicators considered important; (3) determining a way of aggregating the components thus identified in such a way as to obtain a single measure of national capability.

The first two steps have been performed repeatedly. A list of indicators often thought essential factors were composed and reduced to manageable proportions, so that measurable elements could be intelligently combined.[16] Among scholars interested in the construction of such empirical estimates of national power there has long been agreement that measures of economic, technological, political, military, and demographic capabilities suffice to furnish a reasonably accurate overall indication.[17] Quantitative indicators are available. The economic capacity of a nation, for example, may be reliably suggested by data disclosing per capita, total, or disposable output. Demographic capabilities are grossly reflected in any calculation of total population or, more accurately, by the fraction in working and/or fighting age-groups. Military preparedness may be inferred from ascertainable expenditures on arms and the size of military forces. Only political capabilities are difficult to measure. The necessary data have not been available until recently, and are not easy to interpret.

This problem of satisfactorily measuring political capability has been a major defect in the construction of measures of power and has important implications for some of the

questions we raise in this chapter and in our study of the consequences and outcomes of war. Our initial steps toward a possible solution of this problem have enabled us to have a try at forecasting who will win and who will lose when nations fight. We deal fully with the problem in our second chapter. All we intend to do here is to present the measures (which exclude direct measurement of political capabilities) that were used to test whether the power distributions and the changes in them, which the models claim accompany the preservation of peace or the outbreak of war, actually obtained before conflicts occurred.

The lack of a measure of political development, however, is not debilitating for the kind of test we are doing in this chapter and in Chapter 3. Direct measures of political capacity become essential only in the estimation of the national capabilities of developing countries.

The reason for this should be made plain. Countries that were industrialized before World War II followed a pattern in which entrance of the mass of the population into the political system was a response to socioeconomic change. Thus, the expansion of the political system lurched forward roughly in step with the expansion of economic productivity and urbanization. Therefore, it is possible in those cases to deduce the level of political development from the measurement of key socioeconomic variables. As we have pointed out, however, this is not possible where this pattern of development has been violated, as indeed it has been by countries that are developing today. In these cases, such estimates, as measures of national capabilities, are seriously defective and should not be used. We shall have a good deal more to say about this problem when we deal with predicting the outcomes of conflict. Fortunately for our purposes here the major powers in the international system whose development in the political sphere coincided with development in the economic one have been the Western nations.

The selection of critical indicators is only a first step. Also required is a method of combining these indicators to form a single measure.[18] Until recently, no such aggregation has been attempted. Frequently, values of all the indicators were presented, and the reader was left to bring them into

some sort of focus. One could derive an intuitive or impressionistic measure if a nation scored equally well on all the elements measured. However, if a country scored well in some areas and poorly in others, impressionistic estimates became fanciful. It is essential, if one is to judge the effects of international power distribution on major conflicts, to establish a single, reliable measurement. In the main, three types of aggregation have been suggested. The first one simply adds the values of the indicators together. A second suggestion is to multiply together, rather than add, the elements of the equation. A third suggestion goes beyond the problem of the form of the aggregation and points out that not all the elements of the power equation are of equal value and that, therefore, components should be weighted.

While many measures have been proposed, only a handful have been developed to the point of genuine utility. We have chosen to compare the two whose theoretical and empirical development is most advanced and at the same time represent the conceptual extremes in the debate over the best method of aggregation.

Using total output as a measure of national capabilities. A. F. K. Organski and Kingsley Davis argued early that gross national product and/or national income could serve as good yardsticks of national capabilities. The utility of measures of total output for the estimation of national capabilities should not be surprising. Estimates of gross national product closely reflect the movement of the underlying variables crucial to the generation of national resources—the fraction of the population of working and fighting ages, and the level of productivity. Measurements of productivity are particularly informative, for the contributions of individuals to the gross national product accurately parallel the levels of available technology, education, capital intensity, and many other attributes crucial to the establishment and maintenance of national power. Moreover, high levels of productivity also denote the capacity of a society to pay for external security, because military expenditures are approximately related to levels of national wealth.

Because total output is at the core (the result of the interaction between the size of the productive population and its level of productivity), the national power equation can be expressed in the following fashion.

$$\text{Power} = \text{Population} \times \frac{\text{GNP}}{\text{Population}} = \text{GNP}$$

In this formulation, total population implies the size of the fraction of members of working age, and per capita product implies the productivity level.[19] The interaction of components presumes an implicit weighting system. Productivity and population are proportionately related. One population twice as productive but half as large as another implies that two individual workers in the less productive economy are required to perform the labor of one in the more productive, but the power contribution of both is the same. This weighting system, while arbitrary, seems theoretically justifiable. More important, it reflects the realities of international politics.[20]

As we have noted, the major defect of GNP as an overall yardstick of national capabilities is that it does not measure *directly* the capability of the political system to do its job, but the problem is not acute in the case of developed countries which became industrialized in the nineteenth century. In their case it is possible to deduce the level of political development from the measures of key socioeconomic variables.

Let us now turn to the second measure of national power resources that could be used in our evaluations of power distributions.

The J. D. Singer–S. Bremer–J. Stuckey (SBS) measure of national capabilities. This measure is important both because the procedure devised by the researchers is interesting and also because they collected the data required in a way that makes their indices usable and not merely admirable.[21]

It is important to describe in some detail how this measure

of power was devised by the Singer group. The core of the procedure was as follows.

a. The authors argued that three major variables are sufficient to give an indication of overall national capabilities: military, industrial, and demographic capacities. Other variables are considered much less important, or are so closely related to the major variables that they are well represented by them and the indicators chosen to denote them.

b. The indicators chosen to measure each of the three factors are: industrial capacity (represented by figures for energy consumption), military capacity (measured by expenditures and the number of men under arms), the demographic component (expressed by total population and the number of inhabitants in cities of twenty thousand and more).

c. Having selected the countries judged to be critical, the authors proceeded to gather data for each. With these in hand, they added up the values of each indicator for all the countries in the system. This total was considered to be 100 percent of the values for that capability for all the countries in the system; each country was apportioned its appropriate percentage share.

d. The percentage share for each indicator for each nation was added up across all indicators, and the result was divided by the number of indicators (six). The percentage result was taken as the share for the country of all the national capabilities available to it in the international system as a whole.

Table 1.1 will help the reader to understand the procedure that Singer and his colleagues followed.[22] This procedure has a number of advantages. It permits standardization of the different components of the index prior to their aggregation into a single indicator. The national capabilities of different nations can be compared without regard to the fluctuations of real capabilities in the system, and the number of nations in the sample can be increased at will and national comparisons can still be drawn, since each evaluation results in a different scale.

Table 1.1 **Computation of National Capabilities Using the Singer-Bremer-Stuckey Model**

	Military Dimension						*Industrial Dimension*		*Demographic Dimension*				*Relative Capabilities*	
Nation	Military Expenditures		Military Personnel		Iron-Steel Production		Energy Consumption		Total Population		Urbanized		Total % All Dimensions	(Index/6) Adjusted %
	Real Units	%	Real Units	%	Real Units	%	Real Units	%	Real Units	%	Real Units	%		
A	1,000,000	33.4	10,000	5.0	100,000	33.4	100,000	50.0	20,000	10.0	15,000	30.0	161.8	27.0
B	1,000,000	33.3	30,000	15.0	100,000	33.3	50,000	25.0	20,000	10.0	10,000	20.0	136.6	22.8
C	1,000,000	33.3	160,000	80.0	100,000	33.3	50,000	25.0	160,000	80.0	25,000	50.0	301.6	50.2
Totals	3,000,000	100.0	200,000	100.0	300,000	100.0	200,000	100.0	200,000	100.0	50,000	100.0	600.0	100.0

NOTE: Table prepared to illustrate how capabilities are derived. All data are imaginary.

Nevertheless, the procedure has some disadvantages that are particularly severe when one tries to make cross-time comparisons, for these can only be made so long as the nations composing the system remain the same. If there are alterations in membership of the system, comparisons become meaningless. This is an especially grievous handicap if one seeks to evaluate the merits of a dynamic model, such as the power-transition model, which demands a comparison over time.

There is another problem. The measure that Singer and his colleagues have produced is a relative measure, in which the capabilities of one nation depend not only on its own performance but also on that of the sample as a whole and of every other nation in the sample. When the relative power of one nation declines, one cannot determine whether this is because that particular nation is doing worse or whether the average growth of the sample as a whole is improving; or, in the latter case, whether the overall improvement of the sample is due to a general increase in performance or to the increase in performance of one nation in particular. One cannot make a satisfactory deduction unless one goes back to the original data from which the percentage shares were computed. And such questions—which nation is doing better, which is catching up with its rivals, which is being outstripped by which of its rivals—are the keys to our tests of the three models.

Comparison of the SBS and total output as measures of national capability. Both measures have advantages and drawbacks. One major advantage of total output is the parsimoniousness of the index and, perhaps, the better quality of the data used in its compilation. On the other hand, the SBS measure, though more cumbersome and more inhibiting to over-time comparison, has the attraction of incorporating some direct measures of the social structure of countries analyzed and of the investments made on defense. It comes down to this question: How do the two measures perform? If one performs more satisfactorily, it should be chosen. If they perform equally well, then theoretical considerations, or considerations as to the utility of the indices for future research, or questions of the resources saved in gathering data, ought to determine the selection. The question of performance is central and cannot be resolved without a rigorous and systematic comparison of the two measures. This comparison was made and is fully reported elsewhere.[23] Here is a brief summary.

The data used in the total output measure for the period 1870–1965 were transformed to make them entirely comparable to those used for the SBS scale. At every point of comparison (for every five years of this time segment), the same countries were selected for the GNP index as had been chosen by Singer and his colleagues for their own. Their GNPs were added and percentage shares calculated to

obtain a relative scale similar to the one developed by Singer. The two series were then compared by means of regression techniques. Because the more recent data were better than earlier information, two comparisons were made: one for the entire period (1870–1965) and the entire sample of countries, and another for the period 1895–1965.

The results of the comparisons show that the two measures are similar and arrive at much the same scaling. When we used the full sample of countries, the two measures, while not identical, were highly correlated, with a coefficient of determination of .86. When we restricted the tests to the shorter period, we obtained a smaller standard error, in spite of the reduced number of cases, and a better overall fit in the regression line. The finding is reflected in the coefficient of determination, which moved from .86 to .95. Finally, in a country-by-country analysis that constituted our second test of reliability, we found again strong support for the view that the two measures make substantially the same evaluation of the behavior of the countries involved. The small differences observed between the two measures can be attributed to the unreliability of the data, unreliability that increases sharply as one goes back in time. We concluded, therefore, that so far as performance is concerned, there is no particular advantage in choosing one measure over the other. Doubts often expressed about the advisability of using a single economic indicator of overall national capabilities are not warranted.

We also concluded that the measure of GNP was to be preferred for three reasons. One is that the data available are probably more reliable for that measure than the several series gathered to construct the Singer index. Second, and perhaps more important, the GNP index is evidently more parsimonious from the user's point of view. Third, and most important, it was a theoretically more attractive measure. We therefore chose to use GNP in spite of our awareness of the inevitable weaknesses attending the utilization of a single series.[24]

Alliance Behavior and Measurement of Threat-Perception

We said at the beginning of this chapter that all theories suggest that the outbreak of major war is a result both of

changes in the power structure of the international system *and* of the willingness of elites to fight in order to prevent or hasten the changes in question. The power-transition model, for example, argues that wars occur only when a dissatisfied great power catches up with the dominant nation. Satisfied powers do not fight. The balance-of-power advocates, on the other hand, contend that all nations will seek to attack their fellows whenever they gain a power advantage over them. Clearly, then, before this and other models can be tested, we must develop a measure of the willingness of elites to fight. We have dipped heavily into the recent work of Bruce Bueno de Mesquita to satisfy this purpose.[25]

The indicators he provides are measures of changes in alliance behavior. The argument runs as follows. If alliances tighten, and interaction among alliance groups decreases, such behavior may be taken as an indication that those who have responsibility for guiding their countries in their international dealings perceive the environment as presenting a threat to the security and/or the power positions of their countries, and are preparing to fight. The opposite behavior—the loosening of alliances—can be taken as an indication that similar responsible elites have judged the danger to have passed or to have been a false alarm. As a consequence, peace should continue. Wars, of course, are not excluded if alliances loosen; but the frequency of their occurrence should be low and they should be presumed to be very largely the function of miscalculation.

The last point is an important one, and encourages a reexamination of the theoretical structure underpinning the measurements. First, we should stress again that it is not simply the degree of tightness or discreteness in the alliance system but the shifts in these arrangements that are critical. Changes toward greater tightness or discreteness make clearer to elites which states are likely to fight *with* them and which *against* them and, therefore, make possible more accurate estimations of what resources will be available to them and to their opponents in the event of war. Obviously, this also clarifies the probabilities of winning and losing. If one assumes uniform rational behavior, this information becomes critical in a decision to go to war. Hence, the connection between *(a)* the elite's perceptions of threat, *(b)* the

tightening of alliances, and *(c)* the decision whether or not to fight. It is this interrelationship that underpins the measurements. In our scheme, therefore, alliance behavior is taken to measure threat.

The assumption of uniform rational behavior requires comment. As Bueno de Mesquita uses it, this assumption screens out an important set of variations in power redistributions that obviously play an important role in the kind of decision-making we are discussing. The alliance measure cannot evaluate the tendency or propensity of different elites to take risks. Plainly, some elites may be more willing than others to take chances and begin wars, if the benefits of the conflicts are seductive enough and if the possibility of winning seems imaginable. On the other hand, more cautious leaders would require a different ratio between benefits and risk before launching a fight.[26]

The assumption of uniform rational behavior also raises important questions in that it precludes consideration of irrational elites. In view of the historical record of elites in societies, stretching from the traditional to the modern, from the democratic to the authoritarian, it is plain that this is a significant omission.

We have raised questions about the inclusiveness of the measure but not about its validity. Any set of measurements dealing with elite perceptions of danger and with their motives in deciding to go to war will inescapably rest on assumptions as to the nature of the paths those elites must traverse in determining whether an environmental change is a threat to the integrity or power position of their respective nations, and whether to fight in response to such threats. A definitive resolution of the puzzle represented by the nature of the mechanisms which influence elites in decision-making would be invaluable, but it is not yet in sight. Besides, such a resolution is not strictly necessary to meet the basic requirements of our effort here.

Let us sketch how the threat-perception indicator was rendered operational. First, measures of alliance behavior were developed from an original scale built from four types of alliance: defense pacts, mutual nonaggression pacts, ententes, and no alliances at all. Defense pacts were considered the greatest commitment between nations, while no alliance represented the least. These relationships were then scaled to reflect the clusters of nations with the greatest similarities and dissimilarities in their commitments. Measures of associations (using tau) were used to estimate the degree of tightness within each cluster in relation to the others. These measures were computed for every year and every nation in the period covered in the analysis.

Using the tightness and looseness of alliances, we developed a simple eight-point scale that reflects both degree of commitment and the direction of change in commitment (see fig. 1.1). A positive position on the scale means that there *has been a change* in the tightness of alliances between the two actors in the pairs under consideration and, in addition, that each of the actors has increased its alliance commitments with other nations with whom the second nation in the pair also has alliances. And a position on the negative end of the scale means, in effect, the opposite of what we have just described—a cutting of ties with the opposite number in the pair and with its allies. A score at the extreme negative pole of the scale indicates that no ties have been maintained by either of the nations and their allies with the opposite number and its allies. Each judgement on degree of commitment and direction of alliances was made by observing the movements of coalitions over a period of twenty years.

And there was still another contingency to cover to avoid

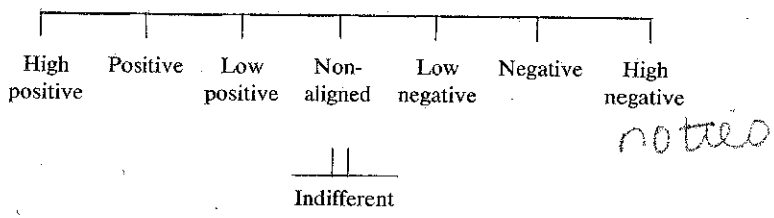

Fig. 1.1 Threat-perception scale.

misunderstanding. There were situations where changes in alliance behavior occurred without moving the relationship of the pair being considered from one side of the scale to the other. For example, the relationship between France and the United Kingdom moved in the period between 1885 and World War I from a high position to a nonaligned position, but the movement was not sufficient to carry the relationship into the negative portion of the scale. In an absolute sense the countries remained friends, but they were less firmly committed than they had been earlier. And to eliminate any misunderstanding, we coded points on the scale stretching from nonaligned to positive as nonhostile, and all of the points stretching from the center of the scale to the negative pole as hostile.

The "indifferent" position on the scale also requires a word of explanation. Nations to be categorized as "indifferent" are nations which do not have and never have had any ties with any nation in the system and have no record on which judgments or predictions can be made. The indifferent position, situated outside the scale, is occupied by nations outside the system. The United States and Japan were precisely in this situation in the nineteenth century. Nations *entering* the international system are also inevitably in this position.

The Actors

Our third task is to identify the nations to be classified as great powers, because this is a step essential to the selection of the wars whose outbreaks we wish to explain. Since major wars can only occur if great powers fight them, to know which nations are to be classified as great powers is a prerequisite for the identification of major conflicts. Moreover, we shall here explain the reasons behind our selection of the particular great powers that we consider the actors best able to test our propositions. The elite nations are few enough to stand out clearly from the rest of the members of the international system on such critical dimensions as population, economic productivity, and military might; international relations specialists have long agreed on their identity. The entire list includes the United

States and the USSR/Russia, the United Kingdom and France, Japan and Germany, China and Italy, and Austria-Hungary.[27]

If we are to test fairly any connections between power changes and the outbreak of war, we need to select different countries from our master list at different times, because not all of the nations we have listed were great powers during the whole of the period covered in our study. The United States and Japan joined the ranks of the great powers in 1900. Austria and Hungary dropped out of the great-power class with the breakup of their unit after World War I.

We also need to distinguish whether the nations involved are members of central or peripheral international systems, and whether the actors are major powers or contenders. The latter distinction is quite important. Contenders alone are strong enough to determine the direction the politics of the world order are to take.

To account for such distinctions, we devised two different sets of criteria. The distinction between center and periphery is indicated by alliances among the relevant actors. (The reader will recall that the behavior of uninvolved nations cannot be expected to follow the rules of the power-distribution models and, so, is not predictable.) Table 1.2 shows which nations belonged in which system in which periods.

The table should make clear that in modern times European hegemony in international politics was complete. Up

Table 1.2 **Major Powers in Central and Peripheral Systems, 1860–1975**

Nations	Years in System	
	Center	Periphery
Italy	1870–1970	
France	1860–1970	
Austria-Hungary*	1860–1918	
Prussia-Germany-West Germany	1860–1970	
United Kingdom	1860–1970	
Russia-USSR	1860–1970	
Japan	1900–1970	1860–1900
United States	1940–1970	1860–1940
China*	1950–1970	1860–1950

* Data not available.

through the nineteenth century, great powers were exclusively European, the substance of international politics was European politics, and world politics consisted of European quarrels, often over other portions of the globe. Although the United States and Japan began to be considered as great powers at the turn of the century, they kept their distance and were really not part of the central system. Only with World War II, when the United States (and to a much lesser degree Japan) became clearly recognized as having sharply outdistanced all of the European powers and had become willing participants in the central system itself, was the system inevitably expanded to include first the United States and then Japan. Most recently, Communist China has become the system's newest important member. This expansion of the central system from Europe to the world is the most critical change in international politics since World War II. And this distinction between the center and the periphery will prove important in one of the analytic steps we plan to take.

Our second distinction, that between major powers and contenders, is made operational in a simple way. We have already argued that the most powerful nation in the world at any given time is always a member of the contending class. Any other nation whose score is at least as high as 80 percent of the capabilities of the strongest nation would also be considered a contender. When no other nation in a given period met this criterion, we considered as contenders the three strongest nations in the system.

It is only in the central system that one needs to define the three most powerful nations, because it is only here that the power-distribution models apply and because, as one would expect, different nations at different times compose the triumvirate of the most powerful. Table 1.3 lists the most powerful countries.

Two points should be noted. Italy and Austria-Hungary, which were on our list of great powers, never make our list of the three most powerful nations of the central system. The United States, on the other hand, surfaces as the most powerful nation in the system only during and after World War II. But the reader should bear in mind that the United

Table 1.3 **Contenders in the Central System**

Contenders	Years
The USSR/Russia	1860–1975
United Kingdom	1860–1945
France	1860–1890
Germany	1890–1945
United States	1945–1975
Japan	1950–1975

States passed all countries in potential power by the end of the nineteenth century and has maintained her lead from that time to ours. She appears on this list only with World War II because it was not until then that she had come to view herself as part of the central system.

Test Cases: Total and Major Wars

We know which nations will be the actors that will perform in our tests. Now let us turn to the selection of the conflicts that will serve as our test cases.

The models we are comparing, it should be recalled, do not claim to establish connections between changes in the international power structure and the outbreak of wars among small nations, or among large and small nations; nor do the models explain colonial wars. Such conflicts (according to the models) may occur unrelated to fundamental changes in the power structure of the system, and, therefore, power distributions in the period preceding such wars cannot be used to disprove the propositions advanced by any of the models we are considering. The hypotheses in question can be tested fairly only if we locate conflicts whose outcomes will affect the very structure and operation of the international system. In short, what we need are major international military struggles.

Our selection of wars, then, is based on three criteria. We thought that a conflict in which a major power actively participated on each side would escalate to proportions we would consider those of a major war. Thus, major-power participation in each opposing coalition became our first criterion. In order to insure that our selection would include

only wars in which both major powers involved made an all-out effort to win, we imposed a second condition: the conflicts selected would be those in which the number of battle deaths reached higher levels than in any previous war. The third criterion, particularly designed to insure that the contestants were really trying to win, was to choose struggles which would result in the loss of territory or population for the vanquished. It seemed reasonable to assume that if the elites of a country viewed, as a consequence of defeat, a threat to the integrity of the nation, they would prosecute the war with all available resources.

The theoretical constraints we imposed in the selection of our sample reduced the number of conflicts available for analysis to five: the Napoleonic Wars, the Franco-Prussian War of 1870–71, the Russo-Japanese War of 1904–5, and World Wars I and II. And of these the Napoleonic Wars had to be excluded because we do not have data series that go back that far. Clearly, four observations are insufficient for any attempt to generalize from regularities that might be found.

The number of conflicts available for analysis could be increased if one ceased to treat collectivities involved on each side of the conflict as if they were one unit. But such increases would still not be enough, if one wished to carry on a number of tests. However, if we tested the behavior of individual nations rather than that of groups of nations fighting on each side in the conflict we would gain greater insight into the way the system works. Hence we decided in our analysis to investigate what happens when the alliances are disaggregated. We followed a two-step procedure. First, we paired each nation on our list of actors chosen as relevant for our tests with every other actor on the same list. Second, we located the periods in which, according to the models, the ratios of national capabilities of the pair of nations would make for war between the two members of the pair and then we determined whether the expected state of affairs actually took place.

Whether war occurred was indexed by coding as "0" any year in which no conflict developed and coding as "1" every year in which one did. The best one can say for such a rigid

dichotomization of our dependent variable is that this is obviously a wasteful way of measuring relations that, in reality, can range subtly in degree from full cooperation to armed conflict. But we simply had to bite the bullet; less gross measures of levels of cooperation and conflict among nations over time do not exist. One consequence of defining operationally, in the binary code "war/no war," the behavior we wished to explain was the necessity of making appropriate adjustments in our continuous index of power to match the new nature of our dependent variable. The procedure we used is described in the next section.

Test Periods and Power Distributions

Two major questions remained to be answered. The first question was how much power needs to shift from one actor to the other before war is likely to break out. Realistically, we could assume that only *substantial* shifts in the power loads among major powers would trigger the beginning of major wars. Since we had settled on an index for our dependent variable that discriminates only whether war actually occurred, we were not interested in an independent variable that would permit us to measure the inching of countries toward war, since the overall transformation is inevitably affected only by means of small yearly changes in power. It certainly would defeat the rules of a fair test to set up an experiment that could establish, nineteen times out of twenty, that the inevitably small yearly changes in power did not trigger off major wars, and to conclude therefrom that no real connection between power-distribution changes and major conflict could be shown.

We solved the problem by turning the question of how far power needed to shift from one side to the other in the system before a war would begin, into a question of how much time needed to elapse either previous to or following the intersection of the power trajectories of the nations involved before a conflict could reasonably be expected to occur, thus arguing that the power changes and the outbreak of conflict were indeed connected. The possibility of turning the question of "how much power" into one of "how much time" also permitted us to reach another major goal of this

research. The propositions set forth by the balance-of-power and the power-transition models appear to contradict one another, and although both models may be incorrect only one of them can be right. To collect evidence enabling us to choose between them, we had to decide how long a period of time was needed to track the movement of all our pairs of warring nations in order to see whether the patterns of growth in power they established moved away from or toward one another during the periods preceding the conflicts.

In posing the question of how much time needed to elapse before changes in power could be expected to trigger off a war, we were also asking how long the periods covered by our test would need to be. There is nothing in any of the theories we have discussed to indicate how long after the power changes that are alleged by the models to trigger a war adversaries are to be expected to initiate their fight. There is no guide to follow in the establishment of "reasonable length." Should one anticipate war or peace a year, ten years, or twenty years before or after the point when two countries become equal? Rates of growth prevalent in the system give a clue to a possible answer. Because such growth is slow, a relatively long period should be required to produce sufficient change in the power distributions between possible adversaries for war to break out. We thought that a period of roughly twenty years preceding each war would be sufficient time. We felt that the years of the actual fighting should be excluded from the analysis, so our estimates leave them out. The wars under consideration fall within each of the segments of time listed in table 1.4.

One task remained before completion of our preparation for the analysis. We had to compute the distribution of power positions between our actors and the rate of change among them over the six periods of table 1.4.

We settled on two simple procedures. We first computed the power relationship by taking the ratios of the GNPs for the entire period for each pair of countries. The country that was less powerful at the beginning of the period was placed for the entire period in the denominator of our fraction. And we took the mean of this ratio to be our indicator of the relative standing of each actor for each full period.

Table 1.4 **Test Periods and the Onset of Wars**

Test Periods	War
1860–1880*	Franco-Prussian, 1870
1880–1900	
1900–1913	Russo-Japanese, 1904
	World War I, 1913
1920–1939	World War II, 1939
1945–1955	
1955–1975	

* Lack of data prevented a start in 1850. War years 1914–1918 and 1940–1944 were excluded from test periods.

With this measure as our point of departure, we next distinguished whether an equal distribution of power existed. In view of the imprecise nature of GNP as a measure of power, a ratio of the means larger than 80 percent was taken as evidence that equality existed between the powers. Smaller ratios were taken as evidence of inequality.

A country was seen to have passed another when the nation that was less powerful at the beginning grew more powerful than the other member before the period ended.

Empirical Tests of the Power-Distribution Models

Now, at last, we come to the analysis of our data. The first question we wish to have resolved is whether an equal or unequal distribution of power between the members of all the pairs of our sample is associated with the members fighting each other. The answer is instructive. When we match our two variables of war and power-distribution we obtain the results in table 1.5.

Were we to go no further, the findings of this table would be quite disturbing. All of our cases are distributed in almost even proportion across the four cells of the table. Wars seem to occur both when adversaries are equal and unequal in power. In this initial step, then, power distributions are obviously not a predictor of the coming of war.

The introduction of the concept of one nation surpassing another in power as the independent variable brings us an important new piece of information. Table 1.6 suggests the distribution of cases obtained when this is done.

Table 1.5 **Power Distributions and Incidence of Conflicts**

War	Power Distributions: Unequal	Power Distributions: Equal
No	81 (86.2%)	26 (81.3%)
Yes	13 (13.8%)	6 (18.8%)

N = 126 pairs
Tau B = .06
Not significant

Both equal and unequal shares of power between adversaries are associated with war. Now we see that if the distribution of power is equal, it is so simply because one nation is passing another and is abreast of it precisely at the time for which we have taken our sounding. But table 1.6 tells us something more. There is no case of military conflict among the most powerful nations of the world when power is shared equally by both members of each pair and when one member is not in the process of overtaking the other. In other words, at the level of great powers, wars occur if the

Table 1.6 **Power Distributions and Incidence of Conflict When Nations Overtake One Another in Power**

War	Power Distributions: Unequal	Power Distributions: Equal, No Overtaking	Power Distributions: Equal and Overtaking
No	81 (86.2%)	11 (100%)	15 (71.0%)
Yes	13 (13.8%)	0	6 (29.0%)

N = 126
Tau C = .05
Not significant

balance of power is not stable—if, and only if, one member of the pair is in the process of overtaking the other in power. This represents an important clue as to the manner in which the international system works. Nevertheless the evidence presented in the table remains inconclusive in regard to the central question we posed: Which of the power distributions suggested by our models actually obtains before an outbreak of hostilities?

The stubborn reluctance of the data to disconfirm one of the hypotheses begins to weaken if we separate major powers from contenders and peripheral countries from full members of the central system. Only then does the distribution of cases across our table point clearly in the direction to be followed for a solution. Table 1.7 presents the distribution of cases after application of the new controls.

The table displays quite clearly the fundamental relationship we wished to trace and does this despite the paucity of the data in several of the table's cells. The major point obtained from the information displayed in the final portion of the table is that, if conflicts occur *among contenders*, they do so only if one of the contenders is in the process of passing the other. This process is clearly, however, a necessary but not a sufficient condition for conflict, because it can also take place without conflict. This finding was obscured in the previous table because we did not account in it for the possible differences in behavior between the major power and the contenders in this regard. There can be little doubt left of the correctness of the power-transition explanation of conflict behavior in the contenders' class. Among major powers, on the other hand, our specific power distributions are not good predictors of oncoming conflict. In their case, the table shows that the same proportion of conflicts occur when the two combatants are equal in strength as when they are not. The major powers seem to fight, whether they are weaker, as strong as, or stronger than their opponents. Such data closely resemble the inconclusive findings in table 1.6. Finally, if one looks at the information on conflict behavior in the periphery in the first portion of table 1.7, one finds that all conflicts occur when combatants are all unequal in strength. In this portion of

Table 1.7 **System Membership, Actors' Rank in Power, Power Distributions, and Incidence of Conflict**

Power Distributions

Periphery

	Unequal	Equal, No Overtaking	Equal and Overtaking	
No War	26 (86.7%)	1 (100%)	4 (100%)	N = 35 Tau C = −.07 Not significant
Yes	4 (13.3%)	0	0	

Center: Major Powers

	Unequal	Equal, No Overtaking	Equal and Overtaking	
No War	51 ~~(100%)~~ 85%	4 ~~(85.0%)~~ 100 %	6 (85.7%)	N = 71 Tau C = −.03 Not significant
Yes	9 (15.0%)	0	1 (14.3%)	

Center: Contenders

	Unequal	Equal, No Overtaking	Equal and Overtaking	
No War	4 (100%)	6 (100%)	5 (50.0%)	N = 20 Tau C = .50 Significance = .01
Yes	0	0	5 (50.0%)	

international relations, the balance-of-power system seems to work (i.e., whenever a balance of power is in effect there is no war). But, ironically, this finding seems to confirm the most serious doubts as to the utility of the model, when one recalls our conclusion (and the reasons for it) that we cannot predict anything about the behavior in the peripheral portion of the system.

We have examined the power distributions as a possible cause of war. Now let us gauge the possible effects of alliances. We should recall that the movement of alliances is our operational indicator of leaders' perceptions of threats. We argued that, if leaders of nations tighten their alliances, this may be taken as a sign that they are frightened of their environment and that they are preparing to fight to protect their nations. On the other hand, if the same leaders loosen their ties with other nations, this may be taken as a sign that they see no danger to their nations from movements in their environment. Of course, we hypothesized that perceptions are as important as capabilities in explaining the oncoming of wars, and this, too, is a hypothesis we will wish to test.

When we look at the role of alliances as factors in creating conflicts among our sample of pairs we find, not at all surprisingly, that alliances do make a difference.[28] Table 1.8 displays the data on alliances and war. In the table we have used only a three-point scale of threat perception: negative, positive, and neutral. Alliances taken alone are associated

Table 1.8 **Alliance Formation and the Incidence of War**

	Positive	Neutral	Negative	
No War	20 (95.2%)	14 (93.3%)	17 (65.4%)	N = 62* Tau C = .29 Significance = .01
Yes	1 (4.5%)	1 (6.7%)	9 (34.6%)	

* No Italian data; periphery not applicable.

strongly with the occurrence of war. In only one case where alliances loosened before the conflict did the pair of nations move into armed conflict. On the other hand, in nine out of a total of eleven cases where war occurred, alliances measurably tightened before the conflict. We should emphasize that the table does not include data on behavior of nations on the periphery because by definition such nations have no alliances with any of the nations in the central system, and it is the lack of interaction on their part that prevents one from predicting their behavior in initiating or joining conflicts.

There is an obvious contradiction in the results of our tests up to this point. We have found the power-transition model to be a good predictor of the coming of war, yet the model discounts alliances as a factor. On the other hand, our tests clearly find alliances to be an important factor in the initiation of major conflict in the central system. To resolve this matter, we shall attempt to approximate as closely as possible a full specification of the model of the power transition. Three elements seem to be critical.

1. The overtaking of one nation by the other will lead to conflict.

2. Rates of growth will influence the probabilities of conflict. The faster the challenger overtakes the dominant nation, the greater the chances that the two will fight. A slower overtaking by the challenger of the dominant nation should diminish the likelihood of war.

3. Alliances should not play a major role in the initiation of war because they are presumed by the protagonists to be reasonably permanent.

The test of this complex proposition required the utilization of every bit of the data we had generated. We used the continuous variable developed to determine the power ratios between nations to indicate the degree of closeness between the power capabilities of the members of each pair of nations. We multiplied it by the indicator of convergence and divergence between the two countries to obtain an accurate picture of whether or not one country passed another and how rapidly this process had been completed. We further used the full alliance scale to indicate the degree of threat the leaders felt. The sample was divided between

contenders and major powers, but those in the periphery were again left out because our theory asserts that the interaction of these countries cannot be predicted correctly.[29] The results of probit analysis are shown in table 1.9.[30]

Table 1.9 **Test of Power-Transition Model**

	Major Powers		
War =	1.0 + .18 Relative Power × Growth	+ .71 Alliance Structure	
Std. Error:	(1.03)	(.12)	
Δ proportion explained:	(0.0)	(.27)	
Proportion explained: .27			
Significance: .004			
N = 44			
	Contenders		
War =	12.4 + 7.0 Relative Power × Growth	+ .7 Alliance Structure	
Std. Error:	(2.16)	(.43)	
Δ proportion explained:	(.57)	(.06)	
Proportion explained: .63			
Significance: .0008			
N = 17			

As a result of this analysis, all of the pieces fall into place, and we can at last describe which factors in which cases play an important role in pushing different actors to fight with one another.[31] The conditions for war appear as follows.

Consider the contenders. Two factors predominate in bringing about any conflict where dominant nations and challengers contend for first place: the power position of the two nations relative to each other, and the speed with which the challenger is passing the dominant nation. The interaction of these two factors accounts for 57 percent of the proportion to be explained. On the other hand, only 6 percent is accounted for by the movement in the structure of the coalitions that make up the international system. We have further demonstrated that the contributions of relative power and of the speed with which the overtaking occurs are approximately equal. Clearly, the contenders are so

strong and dominate the international scene so completely that, in deciding whether to plunge the whole system into war, they are almost impervious to the claims of other nations or to their plight.

Consider now the major powers. In their case the two factors that explain most of the difference in the behavior of the contenders account for nothing at all. Alliances, which in the case of contending major powers accounted for almost no change in the incidence of armed conflict, are precisely the factor that now accounts for the behavior of the contenders. The proportion explained by the behavior of alliances accounts for all but 1 percent of the 27 percent explained by the model in these cases. Clearly, in the decision processes of major powers, the most important common factor in determining whether or not they fight is the ties they have with other nations. Their experience is, thus, exactly the opposite of that of the contenders.

What is one to make of the "dependence" of great powers in the past? It is certain that a finding of such dependence would not surprise us in the nuclear age, but one has the impression that great powers acted under far less constraint in the past. The obvious inference is that even before the nuclear age the great powers, although far stronger than the middle and small powers and very much involved in the diplomatic interchanges that preceded wars, were not the initiators of major wars. They fought when others decided to fight. The principal difference in their role then was that, when they fought, their intervention was of critical importance in deciding the outcome of the conflict; now they can make no major contribution to victory in a nuclear war. In the nuclear age, the preeminence of the superpowers seems complete.

Our findings confirm most of the major tenets of the model based on the power transition.[32] To be sure, the model does not predict war with certainty but it outlines with great clarity the necessary but not sufficient conditions for war. War is associated with shifts where one contender passes another in power. The speed with which the challenger overtakes the dominant nation is an important variable in governing the chances that the passage will be carried out in peace. Finally, alliance commitments to other nations do

not count for much with those that have the final say in initiating major wars, but they are critical in the case of major powers.

Our comments on the role of alliances represent a major part, but still only a part, of the story of the manner in which alliance behavior can inform our understanding of the determinants of the outbreak of war. One can gain glimpses of other ways in which distributions of power, including those within and across alliances, may have an effect on destabilizing the system. Now statistical analysis (because there are too few cases) must be set aside. But one can explore for possible hints in two of the four cases of major wars in which alliances play a major role and for which data are available. What one needs to do is to view the behavior of national capabilities of original combatants—whether they are individual nations or coalitions—in the light of the familiar hypotheses in our model connecting power structures to conflict. Such an approach can be fruitful of new insights and hypotheses, which, of course, should not be confused with evidence from which generalizations can be drawn.

Of the four conflicts for which we have data, the Franco-Prussian War of 1870 and the Russo-Japanese conflict of 1904–5 are not useful to us because the two principals concerned in each case fought unaided by allies.[33] World Wars I and II, on the other hand, are two conflicts in which large coalitions were involved on each side of the military struggle. Our estimate of the power resources (measured in GNP) available to the two Central Powers (Austria-Hungary and Germany) immediately before World War I amounts to 62 percent of the total resources available to the Allied side (Russia, France, and the United Kingdom). The estimate of resources available to the Allies is in our view inflated by a Russian GNP value which reflects the substantial but largely unmobilizable population of the country at the beginning of the First World War. On the other side, if one adds Italy to the coalition of the Central Powers (and Italy was indeed a member of that coalition almost up to the beginning of hostilities), the pool of resources available to the Central Powers was 77 percent of the resources available to the Allies. Roughly, then, the power positions of the two coalitions just

before the world conflict began was roughly what the model based on the power transition would lead us to expect. Even more important, if one looks at the vectors of power of the two coalitions, one sees that the sides close the gap separating them over the twenty years preceding the coming of the war.

In World War II, one sees a repetition of the behavior we have just described. If one considers the three major powers that entered the war in the first days after hostilities began, and whose differences transformed the German attack on Poland in 1939 into a world war, changes in the levels of national capabilities move very much in the way the power-transition model leads one to expect. Immediately before the war the value of the pool of capabilities available to Germany alone is roughly 90 percent of the pool available to the Allies (France and the United Kingdom). If one adds Italian resources to the German pool, although Italy entered the war almost a year after it began, the Axis is somewhat stronger still than the Allies. Either way, the two sides are approximately equal. If one looks back twenty and ten years before the war began, the two sides are far apart, with the countries that later become the Axis powers gaining ground rapidly. Again, the evidence seems to support the hypothesis prescribed by the power-transition model.

But when coalitions are involved, the change in the levels of the pools of resources available to the combating sides are only part of the story. If one continues to probe and singles out in one coalition the dominant nation and in the other the challenger, and compares the resources available to each of them, one finds that shifts in the amounts of resources available to the two nations leading the stronger and the weaker coalitions may be an important element in moving the two sides toward war. In the case of World War I, the United Kingdom begins with an advantage over Germany some twenty years before the war, with Germany catching up by 1905. By 1913, Germany has clearly surpassed the United Kingdom. After losing the war, Germany drops behind the United Kingdom in 1919 (Germany has at this point 84 percent of the power of the United Kingdom),

catching up with it in the early twenties and retaining a minimum advantage for the ensuing decade. Then, the "scissors" begin to open. By the time World War II breaks out, Germany has a significant advantage over the United Kingdom.

The pattern one can establish by considering first the power of each of the contenders taken alone and then that of the entire coalition they form seems to be as follows (see fig. 1.2). When considered separately, the challenger has overtaken its major rival prior to the eruption of the conflict. So the temptation on the part of the dissatisfied challenging power to risk trying to break the opposing dominant nation by force of arms is understandable, as are the hopes of the challenger for a quick victory. After all, the challenger is stronger than any single nation clearly ranged against it. Force of arms appears the only way by which it can, in the short run, undertake to impose its will. Equally understandable, however, is the outcome of the war that the challenger

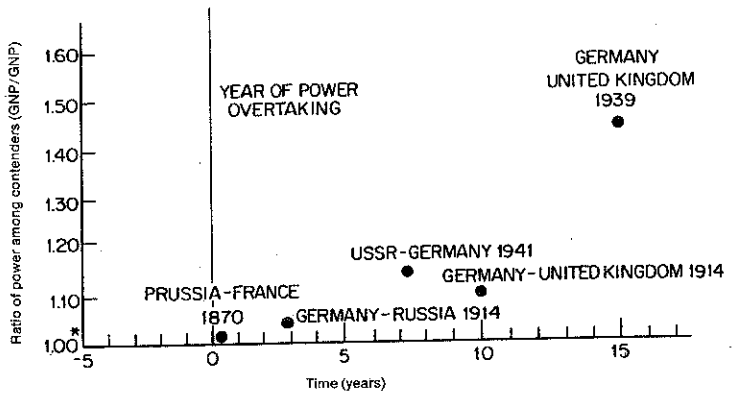

Fig. 1.2 Power ratios between challengers and dominant nations, and timing of overtaking.
NOTE: Challengers are listed first, dominant nations second.
* Contenders are equal in power.

thus initiates. The coalition which the hitherto dominant nation has put together cannot be overtaken because the challenger has fewer and weaker friends than the dominant nation, and cannot muster a coalition capable of overcoming the combination of powers ranged against it.

Our analysis leads to a possible insight on yet another point. If one looks at the point at which conflicts begin in relation to the point at which the trajectories of the challenger and the dominant nation intersect, it is clear that conflicts occur after the intersection when the two nations fight alone (which is contrary to what the power-transition model leads us to expect), but before the coalition of the challenger overtakes the coalition of the dominant country. With such small numbers one has, at best, traces of trends, but this seems a curious pattern. Conclusions are obviously impossible. One could at most hazard some plausible explanation that might constitute the beginning of the formulation of a hypothesis. When two nations fight alone, there can be little doubt in the defender's and attacker's minds what their respective positions are and what will be the prospects for each if things are left to drift. On the other hand, when alliances are present the challenger may be in a position to afford to hesitate longer, for there is always hope that some important country will be separated from the rest of the defending coalition, thus tipping the balance. The dominant nation, secure in the support of the stronger coalition, also may tend to procrastinate before it faces up to the necessity of trying to turn back the foe.

Our data ever so indirectly suggest why some theorists believed the balance of power brought about wars. We must hasten to add that, while much of our scenario drawn is based on evidence, a good deal of it is still based on conjecture. Our data reveal that the largest number of conflicts have occurred after the point of intersection of the power trajectories of the competing countries. The sightings that led to the refurbishing of the balance-of-power theory just before the turn of the century were taken when the aggressor seemed to tower over the dominant nation and the major powers of the defending coalition, and the challenger's truculence and superior strength seemed plain for all to see. An imbalance of power seemed clearly to bring about war. To assume that a balance would bring about peace seemed sensible. What was missed was critical but not plainly visible: the fact that the challenger had been the weaker party only a generation earlier and had leapfrogged over the dominant nation. If this is so, the theorists of the balance of power of the time committed the cardinal sin frequently indulged in by social scientists of building dynamic models with no longitudinal data at their disposal and with observations drawn from, at most, one point in time. Inevitably, they made assumptions and inferred a large number of behaviors that fit the data they could see. Their guesses were entirely plausible but also entirely wrong.

This long footnote to the possible effects of alliances on the conflict behavior in the system concludes the analysis of our data.

Conclusion

Our probes point firmly to the fact that the basic propositions in the balance-of-power model miss most if not all of the critical behaviors our data show to be responsible for moving a whole system of nations toward major war. It is not only details in the model that are in error. The conception of the system that underpins this model seems to be wrong.

It is the model based on the concept of the power transition that specifies correctly the behaviors, and the connections between behaviors, that our data show to be the necessary conditions for major wars to break out.

The mechanisms that make for major wars can be simply summed up. The fundamental problem that sets the whole system sliding almost irretrievably toward war is the differences in rates of growth among the great powers and, of particular importance, the differences in rates between the dominant nation and the challenger that permit the latter to overtake the former in power.[34] It is this leapfrogging that destabilizes the system.

The relative speed with which both countries travel on their power trajectories is also important. The faster one nation overtakes the other, the greater the chances for war.

Finally, this destabilization and the ensuing conflict between giants act as a magnet, bringing into war all the major powers in the system, dependent as they are on the order established by their leaders for what they already have, or for what they hope to gain in the future if they upset the existing order. And alliances are important as a cause of war in yet another way. While it is true that the challenger overtakes the dominant nation and that at the outset it is the challenger who is the stronger, it is equally true in the two cases tested that the coalition with the dominant nation is stronger than the coalition shaped by the challenger to unseat the leader and recast the international order. When there are changes in the levels of power of the two leaders and in those of the two coalitions both sets of changes are responsible, in different ways, for bringing the two sides to the point at which they fight.

One final point. Anyone who probes for regularities in the conflict behavior of the tiny set of elite nations cannot but feel uncomfortable about the thinness of the evidence on which one hazards generalizations. Given the dearth of cases available for comparison and the few observations generated from them, how valid can such generalizations be? How can one ever be sure of not having over-stepped the bounds of the evidence? We can only repeat our warning: the results we have presented must be treated not as definitive answers but as tentative findings. Nevertheless, results must still be taken seriously. Just how serious such findings may prove to be and how powerful the theory which led to their unearthing really is, can perhaps be suggested by the following simple test. If we were to assume that, in each case we have studied, the leapfrogging process between contenders and the war that followed were totally independent events, what would be the likelihood of those events occurring simultaneously, as they actually did? Such a probability can be calculated in two ways. If one takes into account the entire period of our study, year by year, there is one chance in ten thousand that the two phenomena would

have coincided had they been independent. And there is one chance in six thousand that the two events would have occurred together, if we use the period of twenty years as a temporal frame of observation. With such results, it seems reasonable to assert that the theory backing our findings must have a good deal of explanatory power.

As we suspected, then, power and power changes are some of the fundamental reasons why wars occur. But the sources of national power of any nation are but the patterns of socioeconomic and political development; and it is differences in the rates of change inscribed in these patterns that we think are responsible in the end for the fact that wars break out. The reader will consider this finding depressing. And, indeed, so do we. The trends in question are not reversible, nor when they act in our favor would we choose them to be if we had the choice. Industrialization, urbanization, political mobilization, and the drafting of the population into political structures cannot be easily controlled. Such trends are simply not manipulable in response to foreign-policy needs. Nor are their political consequences at the international level. International political engineering, especially among great powers, has more myth than reality to it.

Let us now turn to a consideration of whether the patterns of growth, and the consequent responses of power, determine the outcomes of conflicts they seem to have caused.