TOWARD A SCIENTIFIC THEORY OF WAR

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The scholars most frequently credited with development of the quantitative empirical study of war include Frederick Adams Woods, Alexander Baltzly, Pitirim A. Sorokin, Quincy Wright, Lewis Fry Richardson, Karl Deutsch, and J. David Singer. Of this set, the contributions of David Singer to the scientific study of international conflict will be judged as paramount. Although Woods and Baltzly (1915), Sorokin (1937), Wright (1942), and Richardson (1960) all compiled data on wars, Singer's efforts with the Correlates of War (COW) Project stand alone. Over the last four decades, the vast majority of systematic scientific analyses conducted on the subject of international conflict have employed some component of the expansive COW Project database. Today, our empirical knowledge of the factors associated with patterns of war and peace is attributable largely to the vision of David Singer.[1]

The Correlates of War Project had its genesis in 1963 with a grant from the Carnegie Corporation to the Center for Research on Conflict Resolution at the University of Michigan. A portion of this grant went to David Singer for the study of war. As did Sorokin, Wright, and Richardson, Singer and his associate Melvin Small culled historical materials for information on war—in this case the frequency, participants, duration, and battle deaths of all wars since 1816 (Singer and Small 1972; Small and Singer 1982). Additional data sets were generated dealing with militarized interstate disputes, alliance membership, diplomatic ties, geographic proximity, territorial changes, intergovernmental organizations, civil wars, and national material capabilities (inclusive of the military, economic, and demographic dimensions of power).[2]

Singer believed that with few exceptions most previous analyses on the causes of war were insufficiently systematic and rigorous. Even the work conducted by Sorokin (1937), Wright (1942), and Richardson

(1960) was of circumscribed value due to the absence of operational definitions for war (Sorokin), legalistic criteria for identifying wars (Wright), or reliability and validity of coding categories (Richardson).[3] The Correlates of War Project database was designed in a manner to avoid such problems; it focused explicitly on the issues of consistency, accuracy, and reproducibility in data generation (as is reflected by information stored in the COW Project Data Archive), and its published products include extensive details on coding rules and sources. Singer's midrange goal for the project was to produce generalizations about the conditions associated with the onset and seriousness of war that could then be replicated and verified by subsequent research. In the end, explanatory knowledge about the causes of war would be developed that could then be applied to the purpose of eliminating war.[4] Without exaggeration, it can be said that the scientific empirical study of war has its foundation in the database of David Singer's Correlates of War Project.

EPISTEMOLOGICAL ASSUMPTIONS IN THE SCIENTIFIC STUDY OF WAR

A fundamental objective of basic scientific inquiry is to provide explanations of empirical phenomena. For David Singer and the Correlates of War Project, the objective is to provide explanations for the occurrence and characteristics of war. In conventional language, to "explain" a phenomenon is to incorporate it within a "cause and effect" sequence—or, at minimum, to locate it within a pattern of existential regularity. It is a principal ontological assumption of the scientific search for knowledge that the phenomenal universe exhibits certain patterns or regularities and that such patterns are discernible. This focus on empirical patterns is consistent with general models of scientific explanation based on either deductive-nomological or inductive-probabilistic forms of reasoning. When an explanation of a phenomenon is provided by reference to a pattern under which the phenomenon is subsumed, this is referred to as a "covering law" explanation. Although there are substantive differences in the epistemologies of empiricist philosophers such as Hans Reichenbach (1951), Richard B. Braithwaite (1953), Karl Popper (1959), Carl Hempel (1966), and Imre Lakatos (1970), all subscribe to the covering law model of explanation in one form or another.

There are two types of covering law explanations: one based on deductive-nomological reasoning and the other based on inductive-probabilistic reasoning. Both models explain events by reference to covering laws. However, the deductive-nomothetic model employs laws of universal form, whereas the inductive model uses laws of probabilistic form. Deductive explanation implies the (internal or logical) truth of the conclusion with absolute certainty; inductive explanation implies the truth of the conclusion only with a high probability. In both cases, explanations based on covering laws can be supplemented by reference to theoretical mechanisms that underlie the patterns or regularities (Popper 1959, 59; Hempel 1966, 51, 70; Elster 1983, 29). In other words, empirical covering laws—whether of universal or probabilistic form—may be accounted for by theoretical mechanisms that refer to underlying structures and processes that produce the patterns described in the laws. Theories attempt to explain these patterns or regularities and to provide a more fundamental understanding of empirical phenomena but treat these phenomena as manifestations of underlying forces governed by the theoretical principles.

Theories contain theoretical terms (internal principles) that have no empirical referents as well as observation terms that are empirical entities or properties that the theory purports to explain, predict, or retrodict. The connection between theoretical terms and observation terms is made by correspondence rules (bridge principles). These rules cross the boundary between the unobservable structures and processes of theoretical terms and the empirical referents found in observation terms. Without correspondence rules (or bridge principles), theories would have no explanatory power and would be untestable (Hempel 1966, 72–75). It should be noted that theories also may be of either deductive-nomological or probabilistic form.[5]

The epistemology of science that David Singer holds is avowedly inductive and empirical. Criticism of this epistemological approach to the scientific study of war has coalesced around a single point: the work cannot produce "causal knowledge" or a "theory" of war. This critique is explicitly articulated in the arguments of Kenneth Waltz (1979), Alexander Wendt (1987), and David Dessler (1991), as well as the school of epistemological thought known as "scientific realism"[6] (Wendt 1987, 350–55). For example, Waltz (1979, 4–7) maintains:

> The "inductivist illusion". . . is the belief that truth is won and explanation achieved through the accumulation of more and more data and the examination of more and more cases. . . . The point is not to reject induction, but to ask what induction can and cannot accomplish. Induction is used at the level of hypotheses and laws rather than at the level of theories. Laws are different from theories, and the difference is reflected in the distinction between the way in which laws may be discovered and the way in which theories have to be constructed. Hypotheses

> may be inferred from theories. If they are confirmed quite conclusively, they are called laws. Hypotheses may also be arrived at inductively. Again, if they are confirmed quite conclusively, they are called laws. . . . Hypotheses . . . no matter how well confirmed, do not give birth to theories. . . . Laws are "facts of observation"; theories are "speculative processes introduced to explain them" [Andrade 1957, 29, 242]. . . . Theories explain laws. . . . Theories cannot be constructed through induction alone, for theoretical notions can only be invented, not discovered.[7]

Similarly, Wendt (1987, 354) argues:

> Whereas the empiricist explains by generalizing about observable behavior, the [scientific] realist explains by showing how the (often unobservable) causal mechanisms which make observable regularities possible *work*.

In Dessler's (1991, 345) view:

> [C]ausal knowledge cannot be captured within the confines of the [empiricist] framework. Causal explanation shows the *generative* connection between cause and effect by appealing to a knowledge of the real structures that produce the observed phenomena, and it is this generative connection that gives the notion of cause meaning beyond that of simple regularity.

This distinction between "causal" and "empirical" science is deceptive. Modern scientific empiricist epistemology—such as that of Hempel (1966)—explicitly fuses empirical covering laws with causal theories (1966, 52–53) in the development of scientific explanations. Indeed, the stated goal of Hempel's epistemology is to produce theory that explains empirical regularity in the most basic and fundamental way, utilizing unobserved entities and processes as mechanisms.

Some of the basis for this unproductive debate over the limits of induction and the creation of causal explanation resides in the preferred sequence for theory construction and empirical observation in the development of knowledge. The arguments of Waltz, Wendt, Dessler, and the scientific realists hold that causal theorizing should proceed independently of empirical inquiry, whereas scientific empiricists believe that work begins at the level of empirical observation, proceeds to the generation of empirical (deductive-nomothetic or probabilistic) laws, and ultimately moves to the level of causal theory—explaining empirical uniformities on the basis of unobserved structures and processes. As Hempel notes (1966, 75–77):

> In a field of inquiry in which some measure of understanding has already been achieved by the establishment of empirical laws, a good theory will deepen as well as broaden that understanding. First, such a theory offers a systematically unified account of quite diverse phenomena. It traces all of them back to the same underlying processes and presents the various empirical uniformities they exhibit as manifestations of one common set of basic laws. . . . The insight that such a theory gives us is much deeper than that afforded by empirical laws; . . . for the laws that are formulated at the observational level generally turn out to hold only approximately and within a limited range; whereas by theoretical recourse to entities and events under the familiar surface, a much more comprehensive and exact account can be achieved. . . . At any rate, the natural sciences have achieved their deepest and most far-reaching insights by descending below the level of familiar empirical phenomena.

In short, modern scientific empiricist epistemology—such as Hempel's—appears fully consistent with theoretical (i.e., causal) explanation based on unobserved structures and processes. However, it anticipates that theory development will follow the identification of empirical laws. It is this epistemology that has guided Singer's research program for the Correlates of War Project.

ANALYTIC LEVELS AND EMPIRICAL PATTERNS

Levels of Analysis

As Ray and Wang (1998, 1) observe, the "level-of-analysis" problem is one of the most important theoretical issues in the field of international politics—an issue with fundamental ontological and epistemological implications.[8] In fact, one of David Singer's principal contributions to the study of international politics is his formulation of the level-of-analysis issue and his explication of its significance for both theory construction and empirical research in the field.

The earliest discussions of war and the level-of-analysis problem are found in Waltz (1959) and Singer (1961b); however, Singer's formulation of the issue differs from that of Waltz. Waltz, in his wide-ranging exploration of the causes of war, examines explanations that derive from the characteristics of individual human beings, the internal structure of states, and the anarchic nature of the international system. These explanatory—or causal—factors are compared and contrasted in terms of their viability as answers to the question of "why do wars occur?"[9]

Singer (1961b) is the first scholar to have employed the term *level of analysis* in the study of international relations and to have explicitly touched on its implications for both theory development and empirical research. Moreover, Singer uses the concept of level of analysis to refer to the unit of observation (i.e., the unit level of the outcome or dependent variable), whereas Waltz employs level of analysis to refer to the unit of explanation (i.e., the unit level of the explanatory or causal variable). Over the years, it has been Singer's conception of the level-of-analysis issue that has dominated quantitative empirical analysis in the field of international politics, as studies are designed to search for patterns of war at different levels of observation for the dependent variable (i.e., the state, dyad, region, or international system).[10]

Empirical Patterns

Both deductive and inductive explanations of empirical phenomena begin with the identification of patterns. For inductively oriented empirical scientists such as David Singer, the process of explanation starts with the systematic collection of data on the phenomenon in question followed by the testing of hypotheses. Once patterns or correlates have been identified, a body of empirical generalizations about the phenomenon can be articulated. Patterns or generalizations that are particularly strong and consistent are termed "empirical laws" (Hempel [1942] 1959, 350–51; 1966, 58–69).

In 1998, Geller and Singer produced a work that identified a series of strong empirical patterns relating to the onset and seriousness of war drawn from a review of more than 500 quantitative data-based studies on international conflict. Descriptions and evaluations of empirical findings on patterns of war were grouped on the basis of the analytic level of the unit of observation (i.e., the unit level of the dependent variable). The levels of state, dyad, region, and international system were employed in this meta-analysis, and empirical regularities were identified at each level. Not surprisingly, the vast majority of the studies available for review used components of the Correlates of War Project database.[11]

Following is the list of empirical uniformities on the onset and seriousness of war classified by the levels of state, dyad, region, and international system (Geller and Singer 1998, 27–28; Geller 2000, 409–45).

FACTORS INCREASING THE PROBABILITY OF THE ONSET (OCCURRENCE/INITIATION)[12] OF WAR

<u>*Level of Analysis: State*</u>

Power Status

Empirical pattern: The higher the power status of a state, the greater the probability of its war involvement.

Power Cycle

Empirical pattern: Passage through a critical point in the power cycle increases the probability of war involvement for a major power.

Alliance

Empirical pattern: The greater the number of a state's alliance ties, the higher the probability of its war involvement.

Borders

Empirical pattern: The greater the number of a state's borders, the higher the probability of its war involvement.

<u>*Level of Analysis: Dyad*</u>

Contiguity/Proximity

Empirical pattern: The presence of a contiguous land or sea (separated by 150 miles of water or less) border increases the probability of war within a dyad.

Political Systems

Empirical pattern: The absence of joint democratic governments increases the probability of war within a dyad.

Economic Development

Empirical pattern: The absence of joint advanced economic systems increases the probability of war within a dyad.

Capability Balance

Empirical pattern: The presence of parity in capabilities or shifts toward parity increases the probability of war within a dyad.

Alliances

Empirical pattern: Dyads where only one member has an external alliance tie have a higher probability of war than dyads where both members have external ties.

Enduring Rivalry
Empirical pattern: The presence of an enduring rivalry increases the probability of war within a dyad.

Level of Analysis: Region

Contagion/Diffusion
Empirical pattern: The presence of an ongoing war increases the probability of subsequent war within the same region.

Level of Analysis: International System

Hierarchy
Empirical pattern: The presence of an unstable hierarchy among the major powers of the international system increases the probability of both major power and systemic wars.

Number of Borders
Empirical pattern: The greater the number of total borders in the international system, the higher the number of war participations in the system.

Frequency of Civil/Revolutionary Wars
Empirical pattern: The greater the frequency of civil/revolutionary wars in the international system, the higher the frequencies of interstate disputes and wars in the system.

FACTORS INCREASING THE PROBABLE SERIOUSNESS (MAGNITUDE/ DURATION/SEVERITY)[13] OF WAR

Level of Analysis: State

Power Status
Empirical pattern: The higher the power status of a state, the greater the probability of its involvement in severe wars.

Level of Analysis: International System

Alliance
Empirical pattern: The presence of polarized alliances increases the probability of the seriousness (magnitude/duration/severity) of war.

In the epistemology of modern inductive science, the identification of these strong empirical patterns of war at multiple levels of analysis is a step toward the development of a scientifically derived theory of international conflict.

TOWARD A SCIENTIFIC THEORY OF WAR

David Singer has long maintained that explanatory knowledge resides at the apex of the processes of science and that an understanding of the factors and forces that move nations into conflict constitutes a basic goal in the study of war (e.g., Singer 1976, 1979b, 1979c, 1980a, 1980b, 1986, 1995, 2000). As early as 1970, Singer speculated as to how that explanation might be shaped. Specifically, he postulated that state attributes, relational characteristics within dyads, and system-level attributes might combine in creating the conditions for war:

> It will almost certainly turn out that certain attributes do indeed make some nations more war-prone than others. . . . I would, on the other hand, expect that these attributes—in order to exercise any consistent and powerful effect—have to interact with certain *relational* variables and with the attributes of the international system at the moment. A nation must, in a sense, be in the "right" setting if it is to get into war. Finally, there is little doubt that all of these ecological factors will have to be taken into account . . . if we are ever to understand the dynamic processes of behavior and interaction which are so large a part of conflict. (1970b, 537)

Twenty-three years later, John Vasquez (1993) provided an inductive explanation of "rivalry wars" based on empirical generalizations drawn from multiple analytic levels—just as Singer had postulated. Vasquez frames his explanation in terms of a series of "steps" that culminate in war. He maintains that rivalry wars (i.e., wars between states equal in material capabilities) begin over territorial disputes. Realist foreign policy practices designed to demonstrate resolve and increase power lead to an escalation of the dispute, enhancing the position of hard-line policy proponents in both governments. As tension increases, further provocative steps are taken until one side initiates violence. These wars have, in specific cases, expanded beyond their original participants to become world wars. World wars occur through a diffusion process produced by the conjunction of three system-level attributes: a multipolar distribution of capabilities, a polarized (tight, two-bloc) alliance structure, and approximate parity in capabilities between the two blocs. According to Vasquez, world wars are only a special class of rivalry wars—subject to the same causal processes but expanding as a result of the confluence of the three system-level conditions. Thus, Vasquez has provided a compelling, empirically derived explanation for subsets of both dyadic and multistate wars based on a series of factors linked in a causal sequence.[14]

As is reflected in the work of Vasquez, there is a growing recognition of the complexity of certain types of social phenomena, and this has led to discussion among social scientists of a process termed "multiple conjunctural causality." In this process, events are the product of the intersection of several factors, and a given event can occur through several different causal paths (Levy 2000, 325). These discussions of complex conjunctive causality frequently refer, as an example, to the phenomenon of war. In retrospect, it seems that as early as 1970 David Singer intuited the direction that causal theorizing on war would take three decades later.

Determinism, Probabilism, and the Causes of War

War is a rare event (Bremer 1995, 17; 2000, 24; Beck, King, and Zeng 2000, 22), and Stuart Bremer (1995, 18) argues that this implies something important about its causation—specifically, that it is the result of a particular or unusual concatenation of a large number of factors. He concludes that models of war that assume simple, deterministic causality will find less support in empirical analyses than models that incorporate chance and uncertainty and thus reflect the underlying complexity of this social phenomenon (12).

Fearon (1996) explores a similar line of reasoning. He speculates that certain social processes may be simultaneously characterized by both predictability and chaos: there may be a high degree of statistical regularity for a given class of phenomena, but an individual case within that class may be inherently unpredictable. For example, Helmbold (1998) demonstrates that the number of global war initiations from 1820 through 1979 is accurately represented as a Poisson process with an average rate of 0.7098 interstate war initiations per calendar year. Projecting this pattern into the twenty-first century, Helmbold predicts approximately seven interstate wars to begin in the decade 2000–2009. However, this pattern does not permit predictions about where those wars will be fought or who the participants will be. Of course, other patterns have been discovered about the probabilities of war between specific states that suggest the identities of the likely participants in those future wars. Here, Diehl and Goertz (2000, 61) examine the distributions and probabilities of conflict for rival and nonrival dyads and conclude that between 1816 and 1992 approximately 49 percent of all wars during that period occur between rival states. Goertz (1994, 208–12) calculates that enduring rivals are eight times more likely than nonrival dyads to engage in war. Therefore, a list of enduring rivals active in the year 2000 would provide a probability estimate of those dyads most likely to engage in the wars that do occur in the decade 2000–2009. However, this prediction would be irreducibly probabilistic (King, Keohane, and Verba 1994, 87), and it remains possible that no amount of information would ever permit the point prediction of a specific war—war may possess the simultaneous properties of both regular empirical patterns in general classes and extreme contingency in single events. In short, some types of social phenomena, including specific wars, may reveal an inherently limited predictability (Geller and Singer 1998).[15]

Multiple Convergent Causal Conditions and War

The observation that wars result from a conjunction of conditions or factors is becoming more commonplace (e.g., Vasquez 1993, 1995; Bremer 1995; Wayman 1995; Geller and Singer 1998; Leng 1999; Levy 2000; Lebow 2000; Russett and Oneal 2001). As Vasquez (2000, 367) notes, the phenomenon of war is so complex that important variables—while not sufficient conditions for war—may be critical in increasing the probability of war, and it is only when multiple factors that increase the probability of war combine that war actually occurs. The same general principle guides the observation by Oneal and Russett (1999, 227) that "an understanding of any war . . . demands not a uni-causal approach but a multivariate explanation."[16]

This process of complex conjunctive causality in the occurrence of certain types of social phenomena was described explicitly by Charles Ragin (1987, 25):

> It is the intersection of a set of conditions in time and space that produces many of the large-scale qualitative changes, as well as many of the small-scale events, that interest social scientists, not the separate or independent effects of these conditions. . . . The basic idea is that a phenomenon or a change emerges from the intersection of appropriate preconditions. . . . This conjunctural or combinatorial nature is a key feature of causal complexity.

Hirschman (1970, 343) makes this argument with regard to the Russian Revolution of 1917, and, more recently, Lebow (2000, 610) presents a similar thesis dealing with the onset of World War I. However, both Hirschman and Lebow discount the value of quantitative empirical analysis as a method for understanding specific large-scale events involving social change. In contrast, King, Keohane, and Verba (1994, 10–12) note that scientific generalizations are applicable to understanding even highly unusual events that do not fall within a class of similar occurrences, and they argue that probabilistic generalizations can be useful in studying even "unique" events. Indeed, empirically derived generalizations identifying convergent causal conditions have been applied in explanations of the Iran-Iraq War of 1980 (Geller and Singer 1998), World War I (Vasquez 1993; Geller and Singer 1998; Thompson 2003), and World War II (Vasquez 1996, 1998).

In summary, there is a developing consensus on the need for a scientific explanation of war based on conjunctural causation—war understood in terms of convergent or intersecting conditions. However, it is also frequently maintained that any of several combinations of conditions might produce a given social outcome (Ragin 1987, 25)—that the complexity of certain social phenomena (such as war) is due not only to the conjunctural nature of social causation, but also to the possibility that multiple combinations of factors or conditions may produce the same outcome. This property of certain types of social phenomena is referred to as "multiple causation" or "equifinality" (King, Keohane, and Verba 1994, 87). As Ragin (1987, 26) argues, it is the conjunctive and often complex combinatorial nature of social causation that makes it so difficult to unravel the sources of major events in human affairs. In fact, if wars occur according to a multiple conjunctural causative mechanism, then the conception of necessary and/or sufficient causation in war may have to be eliminated, since no factor may be *either* necessary or sufficient for war (King, Keohane, and Verba 1994, 87; Bremer 1995, 21). This line of reasoning has led to four attempts to construct empirically derived explanations of specific wars based on the process of multiple conjunctural causation.

Scientific Explanation of Specific Wars

Scientific explanation of particular events involves the identification of general or "covering laws" that govern those events. Empiricist philosophers such as Hempel, Popper, Braithwaite, Reichenbach, and Lakatos all refer to explanation by means of a covering law model. Hempel ([1942] 1959, 347) extends this argument close to the radical limit established by David Hume ([1748] 1894) in stating that "every 'causal explanation' is an 'explanation by scientific laws'; for in no other way than by reference to empirical laws can the assertion of a causal connection between certain events be scientifically substantiated." This position serves as the foundation for empiricist explanations of phenomena in the physical, biological, and social sciences (Guttenplan and Tamny 1971, 344). Similarly, King, Keohane, and Verba (1994, 42–43)—in their discussion of the basis for understanding "unique" historical events—contend that the best way to understand a particular event may be through the application of the methods of scientific inference to systematic patterns in similar parallel events.[17]

Scientifically derived inductive explanations of specific historical wars based on the identification of generalized patterns of war have been produced by Vasquez (1993, 1996, 1998a) and Geller and Singer (1998). These explanations emphasize the complex combinatorial nature of causation in war and describe World War I, World War II, and the Iran-Iraq War of 1980 in terms of multiple convergent or conjunctural conditions. The explanations demonstrate that these wars were specific instances of a conjunction of factors that have appeared in a larger number of cases, and, although the wars were not inevitable, they were high-probability events consistent with a broad array of empirical patterns.

CONCLUSION

Future research may uncover a simple causal condition for war and refute the argument that wars are the product of multiple conjunctural causation. However, be that as it may, it appears that David Singer's approach toward developing an empirically grounded theory of war is progressing precisely along the lines that he framed in 1970. The research program designed by Singer for the Correlates of War Project to produce descriptive, predictive, and explanatory knowledge on international conflict is advancing in all three areas. The success of this research program is also illustrative of a broad principle of scientific epistemology: that the presumptive separation of description, generalization, and theory construction in modern empirical science—as argued by Waltz, Wendt, Dessler, and the scientific realists—is demonstrably wrong.

NOTES

My thanks to Paul F. Diehl for his valuable comments on an early draft of this chapter. However, I am solely responsible for the views presented here.

1. See Midlarsky (2000b, 329). In addition to his work in developing the COW Project database, Singer and his initial set of collaborators produced

some of the earliest and most important large-scale quantitative empirical analyses on the war effects of: alliances (Singer and Small 1966b, 1968a), intergovernmental organizations (Singer and Wallace 1970), system-level capability concentration (Singer, Bremer, and Stuckey 1972), national cycles (Singer and Cusack 1981), and regime type (Small and Singer 1976).

2. There are numerous descriptions of the Correlates of War Project outlining its inception and development, ontological and epistemological assumptions, published works, and data sets. A few examples include Singer and Small (1972), Singer (1979b, 1980a, 1980b, 1990b), Russett (1979), Deutsch (1980), Small and Singer (1982), Vasquez (1987, 1993), Merritt and Zinnes (1990), Gochman (1990), Small (1990), Gochman and Sabrosky (1990), and Diehl (1992).

3. Merritt and Zinnes (1990, vi–vii).

4. Over the years, Singer has expressed the hope that such scientifically derived knowledge on war would be used by government leaders to produce better-formulated policy and minimize human suffering (Singer 1990a). This goal guided the studies found in Singer and Wallace (1979) and Singer and Stoll (1984).

5. See Hempel (1966, 68–69) for examples of probabilistic theories. See Geller and Singer (1998, 13–16) for a comparison of deductive and inductive forms of reasoning.

6. Characteristic of works from this perspective are Bhaskar (1979) and Wylie (1986).

7. See Vasquez (1987, 111–16) for an excellent discussion of Waltz's critique of induction. See also Chan (2002, 750) on this subject.

8. See Ray (1998b, 508–13) for a discussion of various aspects of the level-of-analysis issue, including the problem of cross-level inference.

9. Waltz (1979) elaborates his arguments and refines his analysis in a later work, arguing that answers to this question of "why war?" drawn from analytic levels below that of the international system are reductionist, and that while factors at lower levels may be useful in understanding the causes of particular wars or grasping the forces that shape foreign policy, only factors at the systemic level can provide a basic answer to the system-level question of "why do wars occur?"

10. See the tables of studies by unit of observation (i.e., unit level of the dependent variable) in Geller and Singer (1998, appendix 2, 197–201).

11. Geller and Singer (1998, appendix 2).

12. The Correlates of War Project defines an international war as a military conflict waged between national entities, at least one of which is a state, that results in at least 1,000 battle deaths of military personnel. The following definitions apply to these terms.

War Occurrence: A dichotomous variable indicating either the presence or absence of war for the unit of observation.

War Initiation: The war initiator is the state that started the actual fighting or first seized territory or property interests of another state.

13. The following definitions apply to these terms.

War Magnitude: The sum of all participating nations' separate months of active involvement in each war.
War Duration: The length in months from the inception of the war to its termination.
War Severity: Total battle deaths of military personnel in each war.

14. Vasquez (2002) offers empirical evidence consistent with an expanded version of his dyadic steps-to-war explanation: here he shows the increasing probability of war for dyads with the presence of a territorial dispute, external alliances, and an enduring rivalry over territory or some other issue.

15. Geller and Singer (1998, 195) propose that whereas structural factors shape the regular empirical patterns in general classes of war, limits to the predictability of specific wars may well reside in the element of human choice—which renders the final step to war indeterminate.

16. See also Russett and Oneal (2001, 176–77) and Wayman (1995, 251).

17. See also King, Keohane, and Verba (1994, 10–12), Fearon (1996, 58–59), and Garfinkel (1981, chap. 1).