Georg Quaas (Leipzig)[1]

Defense Pacts and the Onset of War. A Causal-analytical Exploration of Unintended Side Effects of Alliances

Since the publication of the studies by Singer and Small (1966, 1968) on the association between alliances and wars, it has been possible to hypothesize on an empirical basis that the probability of war is at least partly--and perhaps without deliberate intention--enhanced by alliances. Subsequently, that hypothesis has been repeatedly debated, in spite of the fact that the empirical findings have been significantly confirmed. For instance, the correlation between defense pacts and war magnitude was checked and confirmed by Ostrom and Hoole (1978) on the dyadic level. They found an increased danger of war within the first three years after alliance formation. Similarly, but at the systemic level, Wallace (1973), found a moderately positive correlation between alliance-generated polarization on the one hand, and duration and severity of war on the other.

Nonetheless, doubts were cast on the causal interpretation of the correlation between alliances and wars already by its discoverers, who noted that even "a positive correlation between alliance aggregation and war, high enough not to have occurred by sheer chance, cannot be interpreted as a demonstration of any causal connection..." (Singer and Small, 1968:257). More sophisticated analyses by--among others--Ray (1990) and Wayman (1990) further nurtured these doubts. A fundamental criticism also came from outside the project: David Dessler (1991) questioned whether the underlying philosophy of science is at all capable of supporting the long awaited breakthrough toward genuine theoretical knowledge, including causal theories. But as Dessler recommends case studies as a way out of this dilemma, it may be that he simply leans toward another research strategy, one, however, which cannot lead us from correlational knowledge to the level of causal explanations.

Studies by Goertz and Diehl (1990 and 1992) and by Quaas and Singer (1998) tried to apply the LISREL approach--well-tested and successfully used in other fields--to causal modeling in nonexperimental peace research. The basic idea of this causal-analytical concept is simple: the correlation between two consecutive phenomena A and W is considered as an opportunity to hypothesize that A is at least partly a cause to W. In the notation of a path-diagram this can be written as $A \rightarrow W$. This hypothesis can be tested against the data in the sense of the critical-rationalist philosophy of science. The above formulated causal hypothesis is refuted if there can be found another explanation for the correlation between A and W; for instance, another phenomenon T that is effecting both A and W. This alternative explanation can be depicted as follows:

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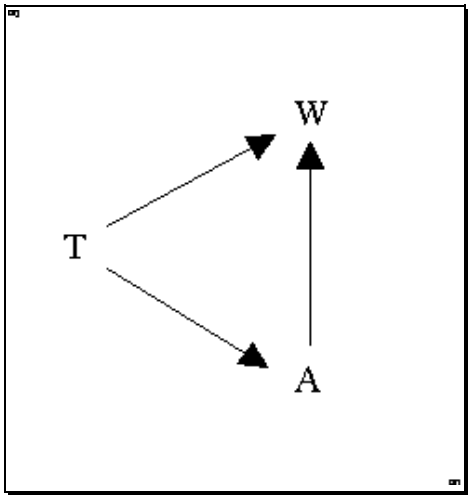

Fig.1: T as a Common Cause for W and A

From this follows the importance of the theoretically and empirically guided search for control-variables, which are called "common causes" in the tradition of the LISREL approach (Saris and Stronkhorst 1984) and which should not be confused with an intervening variable I, for instance, in the sequence A→I→W. This search is a crucial precondition for the test of the "theory" A→W against the data. And as Karl R. Popper has pointed out, every decision on a theory presupposes the acceptance of another hypothesis; in the context of a LISREL test we need at least the two hypotheses T→A and T→W for controlling the hypothesis A→W.

From a methodological point of view, all hypotheses are to be translated into one linear structural equation model, which can be estimated and--under special circumstances--tested against the data with the help of the LISREL computer program. According to several criteria of goodness of fit the researcher can decide to keep the hypotheses or to replace them with others, altering the model.

It should be stressed that the two hypotheses which bring the common cause into the game can be tested in another round of model construction. We hope that this very brief description of the LISREL approach to the test of causal theories demonstrates that it has an integrative function for the hypotheses being tested.

So let us turn to the problems of our particular research interest. What could be thought as a common cause for the test of the hypothesis Alliances→Wars? In the already mentioned predecessor study (Quaas/Singer: 283-285) we referred to the well known literature in which the number of interaction opportunities between and among states of the international system--including those interaction opportunities that are created by geographic contiguities--is regarded as suitable for constructing a control variable. This conclusion is not only theoretically plausible, but is justified also by the empirical indications. The hypothesis that contiguities enhance the likelihood of war can be regarded as part of a venerable tradition beginning with the early analyses and discoveries of Richardson (1960: 176), Wright (1964), Rummel (1968) and Weede (1970), and continuing up to the more contemporary view that proximity between nations provides opportunities for interactions which increase the probability of war (Starr/Most 1976:614, 1978:441-467, 1983:92-117). Likewise plausible should then be the hypothesis that a rising number of opportunities for interaction enhances the probability of alliance formation, as can be seen in the reported correlations below; and indeed, this is empirically true.

The data bases

This study is restricted to the list of wars, alliances and contiguities of the well-known Correlates of War (COW) project, which was inaugurated in the early 60s and long directed by J. David Singer at the University of Michigan. Since its early days the project attracted scores of students and scholars who contributed hundreds of studies to the theory and data-base of "peace science," a field of study within quantitative international politics. The present study relies on both the data and the theoretical insights of peace science in pursuing the link between alliances and wars. I used the COW data, updated through the mid-90s. My focus is exclusively on interstate wars. From the data set ALLIANCES, only defense pacts are used here, as distinct from neutrality (non-aggression) pacts and ententes. The reasoning behind this choice is simple: the most stable findings on the relationship between war and alliances are connected with defense pacts. In regard to the theoretical framework it should be stressed here once again that I used the cited insights of others and tried to overcome the restrictions of correlational analysis by formulating and testing a causal hypothesis. Our theoretical deliberations are described as follows.

The "invisible hand" hypothesis

The discovery of the association between alliances and war was a result of a test of so called "realist" models of international relations. When, according to these models, every state is free to follow its own interest and, for example, is able to join or to leave an alliance whenever the security situation makes it necessary, then the crosscutting moves and actions by various states will cancel out and adjust each other, and produce a maximum of mutually beneficial stability in the system. As a metaphor for the mechanism that transforms nation-state self interest into a supra-national good, Adam Smith's image of an "invisible hand" operating outside the conscious intention of the actors can be invoked to explain how uncoordinated activities work together to achieve an unintended common good (Singer 1992:1). Such a mechanism presupposes an international system with a high degree of internal flexibility of the states to pursue their national "interests" unhindered. The theoretical idea was to consider alliances as restrictions which hamper these balancing tendencies of the system, and which lead in this way to tensions, and eventually to violent eruptions that are called "wars." With these theoretical deliberations, Singer and Small constructed their approach to the empirical test of one of the basic principles of the realist school in political science.

From this point it is only a small step to the operationalization of the decisive concepts. Obviously, the internal flexibility and fluidity of the international system is at its highest level when every state can deal with every other state without having to consider already existing alliance bonds. If n is the number of states in the system, then every state can deal freely with $n-1$ other states, and altogether there are $n(n-1)/2$ opportunities for interactions in the system. These *interaction opportunities* are restricted by alliances of different types, and most of all by those which oblige the partner to active reaction, i.e., by defense pacts. The greater the number of alliances in the system, the less the freedom of states to act independently; and the extension of the alliances should also further this effect. The concept of interaction opportunities as an indicator of the flexibility and stability of the system fits best when the system comprises interactions produced and restricted not only by alliance bonds, but also by geographical borders.

These plausible considerations favor a particular choice among the many indicators that could be constructed to quantify alliances and wars. In general, alliances of several states can analytically be thought as a complex of bilateral relations (dyads). Although depicting alliances as a complex of states would also be possible, this would probably underestimate the number of restrictions to

the interaction opportunities. Regardless of the fact that it seems to be popular to analyze dyads, a replication of the Singer/Small study should indeed be conducted on this level.

The present exploration differs in another crucial point from the original Singer/Small design. This is the (in the meantime partly supported) inverse relationship between the *frequencies* of wars on the one side and the *severity* on the other (Levy/Morgan 1984:731-749). If this inverse relationship exists, with which indicator--*frequency* or *severity*--should we measure the likelihood of war in the system? Singer and Small gave the following answer: "the correlation of alliance aggregation with mere war frequency would be of limited interest (if not downright misleading) and further gradation is clearly necessary. This gradation is achieved in the first instance by use of the nation-months-of-war measure, so that the simple *magnitude* of each war is the sum of the months which all nations individually experienced as participants in the war" (1968:259). On the other hand it is clear that the onset of war should be at the center of our attention (Singer/Small 1968:260), and it is just the *frequency* that functions as a measure for the onset more than the magnitude or the severity of war.

In the above-cited theoretical deliberations the authors paid no attention to 3 of the 4 very low correlations between defense pacts and frequencies of war, while the higher correlations of the other indicators were regarded as more important. An analysis on the dyadic level allows us to circumvent this not fully plausible decision. Neither the *severity* nor the mere *frequency* of wars adequately represents the hypothetical effects of alliances, but the number of dyads into which wars can be broken down analytically does. And a war dyad comes into existence at precisely that point in time at which states begin a war with one another for the first time. It is, incidentally, as a consequence of this that the statistical problem of nonindependent observations of dyads shows up. But this does not necessarily mean that the correlations are artificially enhanced.

There is a third crucial point which should be mentioned here. The above discussion could tempt one to consider the total number of alliance dyads (bonds) existing in any period as systemic "cause" or precondition of war. I went this way with Singer, and came by an empirical test to the conclusion that this hypothesis has to be rejected (Quaas/Singer 1998). However, after taking into account a much broader range of indicators, I came to the conclusion that the act of alliance formation, or of joining an alliance, is more important than extant alliance bonds. As will be seen in the following text, this led to a new assessment of the hypothesized causal relation between alliances and wars.

A necessary, but not sufficient condition for the contention of a causal relationship consists in the sequence between cause and effect. In the predecessor study it was found that 50% of all wars that follow alliance formations occur within three years (Quaas/Singer 1998:294-295). In accordance with this finding, the total time span examined here--from the Congress of Vienna almost up to the decay of Warsaw Pact--has been consistently divided into three-year intervals. This was done by two methods. For the computing of the correlations that are underlying the test of causal models with the help of LISREL, the whole period was *arbitrarily* divided into three-year intervals from the beginning, rather than into three-year segments following each hypothetical cause. The last method, i.e. measuring the war variable within a three-year interval following the measuring of a (hypothetical) cause, was used in the second part of our investigation when I try to develop a model that makes the distribution of “cause” and “effect” events visible in “space” and “time”. By both methods the necessary time order is guaranteed.

Research strategy considerations for the choice of indicators

The broadening of the empirical base by the construction of additional indicators results in an increased size of the correlation matrix which is deduced from them. If the empirical base comprises, for instance, then 11 indicators for war and 7 indicators for the type of alliances explored here, 11 x 7 = 77 correlations can be derived. The question arises which of them should be chosen for the test of causal models.

It is certainly possible to construct measurement models that bind a set of indicators together on the assumption that there is an underlying latent variable for the whole set. The problem is that the construction of a latent variable (factor) should be theoretically reasonable, but there is little or nothing at all known as yet about the relationship between and among the indicators in question. This is why the method of a factor analysis was abandoned, and replaced by a selection of indicators that is theoretically defensible.

In the predecessor study we chose to examine the indicators with the highest correlations between alliances and wars. The reason was not to demonstrate causality at all costs (which would be a very naive enterprise), but to make the rejection of the causal hypothesis a more difficult task. Notwithstanding, the results of our analysis were unmistakeable: despite the highest-correlation selection criterion, the assumption of a causal relationship proved not to be sustainable.

The logic of this same research strategy behooves us to repeat the test as soon as we find a similar or higher correlation. If another test should show that the causal hypothesis fits the data, then the question would arise, whether we could still with a clear conscience justify the selection of indicators according to the highest-correlation rule.

The answer is "yes" for the following reasons: It would certainly be absurd for the search for causality to discard just those correlations which make causal relationships visible. The goal of empirical research into this question is largely nothing else than to find a perspective that will let us discern a possible causal relationship. The choice of indicators defines such a perspective. And simply said, this means looking for strong and stable correlations. This is a principle that has governed the quantitative research on the correlates and causes of war for the past four decades or more. There is no reason to throw it overboard.

The basic correlations

From the available indicators, I have used those that allow me to regard the causal relationship between alliances and war as being ripe for another critical LISREL test. The very low correlation of 0.2 might have softened the refutation of the causal hypothesis in the predecessor study. This was the correlation for the theoretically justified indicators *dyads of existing alliances* and *dyads of wars underway*. If one replaces this combination of indicators--still at the dyadic level--with *newly formed alliances* and the following *beginning wars*, a correlation of 0.37 results. This higher correlation allows me to draw a different picture.

Some remarks on the details of the measurement are in order. The variable *interaction opportunities* was measured one interval earlier than the measurement of the variables *alliances* and *contiguities*, because the former can be regarded as a structural precondition of the latter two (in which sense, see below). The measurement of the *war* as a hypothetical effect of *alliances* and *contiguities* took place, accordingly, in the following period. The variables measured in this way constitute a dated data set of consecutive 3-year intervals, relating cause-variables to the preceding intervals and effect-variables to the corresponding following intervals.

It is essential that all these variables be paired as dyads. The fact that there is no available cause-variable related to the very first interval nor effect-variable related to the last made us eliminate the first and last intervals. Moreover, I took into account that the latest measurement of alliance formations was conducted for the year 1984. Fifty-six 3-year periods cover the time-span from 1818 up to 1985. These data were the input for computing correlations with the help of SPSS. Here is the result:

Correlations:	IOS	TPS	ALL	WAR
IOS	1.0000	.7636**	.0165	-.0226
TPS	.7636**	1.0000	.2253	.2139
ALL	.0165	.2253	1.0000	.3699*
WAR	-.0226	.2139	.3699*	1.0000

N of cases: 56 2-tailed Signif: * - .01 ** - .001

Tab. 1: The Basic Correlations

The abbreviations are as follows:
- IOS is the variable *interaction opportunities* of the previous period;
- TPS is the number of direct and indirect (colonial mediated) *contiguities* (land borders and borders at sea up to 12 miles), called touching points;
- ALL is the number of *alliance formations* and joinings at the dyadic level, called alliance dyads;
- WAR is the indicator for the *war dyads* which are measured in the corresponding following interval, called dyads of war-going nations, next period.

The reader should notice the fact that not all correlations are significantly different from zero.

The LISREL test

Applying the LISREL approach, 3 very simple causal models were tested which corroborate either the causal hypothesis or the corresponding null hypothesis. The following little series puts both hypotheses to the test against the empirical data, while checking out the effect of the control variables by introducing paths into or out of the model. The aim is first to enhance the fit of the model to the data, and then to enhance the explained variance of the war-variable. In addition, I have tried to follow the principle that only theoretically plausible models should be tested (Saris/ Stronkhorst 1984:265-268).

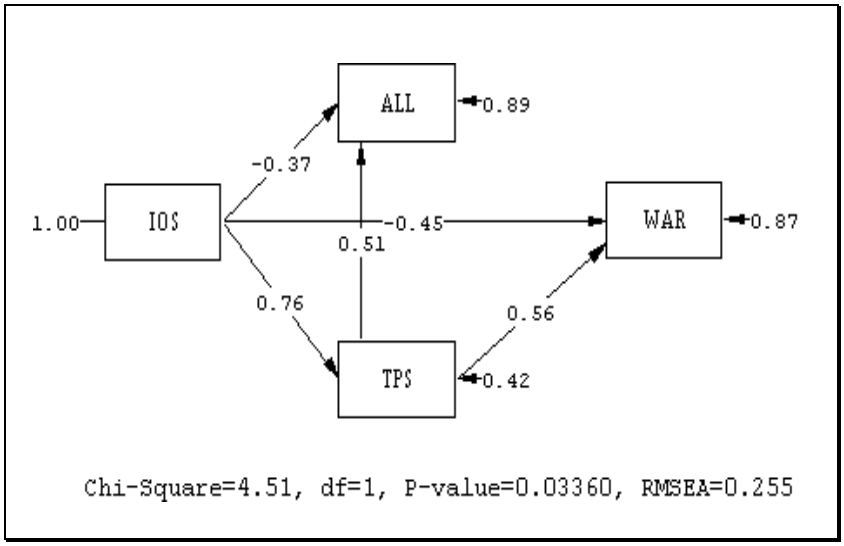

Fig.2: Causal Model 1

Starting with the model with which the Quaas/Singer study concluded, I tested the hypothesis that there is no causal relationship between alliances (ALL) and war (WAR) (see Fig.1). This is the null hypothesis. When we look at the chi-square function, which can be as high as 3.84 with a 5% probability of rejecting a true hypothesis, we see that the model does not fit the data. The null hypothesis must be regarded as refuted. Moreover, the path leading from touching points (TPS) to alliances (ALL) is substantially problematic, because these two variables are measured at the same time, whereas a causal interpretation of that path presupposes a succession. We shall try avoiding this path in the following test. This leads us to model 2:

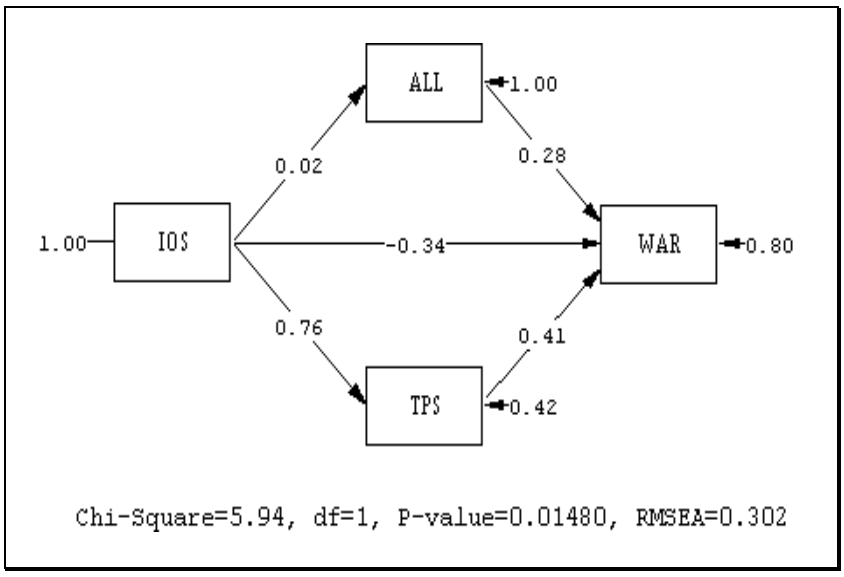

Fig.3: Causal Model 2

This is a test of the hypothesis that there is a causal relation between alliances (ALL) and war (WAR) (see Fig.3). The corresponding path is controlled by the variable interaction opportunities (IOS). However, the chi-square function exceeds the critical value of 3.84, i.e., this model does not fit the data either. The causal hypothesis has to be considered as refuted at a level of a 5% probability of being mistaken. However, we can observe that the path leading from interaction opportunities (IOS) to alliances (ALL) seems to have become superfluous. This could indicate a

specification error of the model. In the model 3, the corresponding path is set to zero from the start.

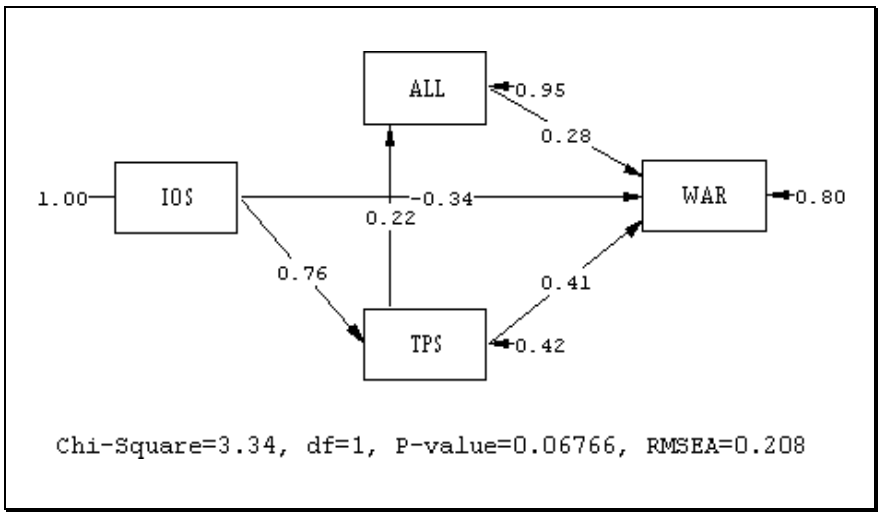

Fig.4: Causal Model 3

Deleting the path from IOS to ALL allows us to introduce another path without changing the degree of freedom of the whole model (see Fig.4). Introducing of the problematic path from TPS to ALL once again is necessary for testing the causal hypothesis. Now the model achieves an acceptable fit. In spite of the strong influences of the common cause TPS, the causal hypothesis A→W has been confirmed. However, we are not fully happy with it, because the model relies on correlations which are not uniformly significantly different from zero. To solve this problem we set all these correlations to zero and repeated the test. The model that corroborated the causal hypothesis came up with a perfect fit, but we consider a perfect fit as not very germane to the situation in international politics. Therefore, we decided to keep the more realistic model 3. But there is another reason to consider model 3 as problematic: it includes the path from touching points (TPS) to alliances (ALL) which does not fulfill the precondition of all causal relations: the effect should follow the cause. The only excuse for accepting this path is this: there is no plausible reason to assume that alliances have an effect on touching points. A possible simplification of the model 3 by eliminating the cause-variable IOS results in a model that cannot be tested anymore, because it fits always to the underlying data.

Preliminary interpretation

As seen above, the hypothesis that alliance formation enhances the likelihood of war cannot be refuted by the control variable *touching points*. As a byproduct, the earlier hypothesis that contiguities are a structural "cause" of war was also tested by model 3. Even controlling for *interaction opportunities*, this hypothesis cannot be refuted; moreover, it is an important part of the explanation of the variance of the variable WAR. With the qualification that both the *alliance formation-war* and the *contiguity-war* results are produced by the not quite unproblematic decisions made regarding model construction and testing, they support the hypothesis that alliances enhance the probability of war in the international system.

The earlier negative assessment of the causal relationship between alliances and war (Quaas and Singer 1998) was a result of a theory-led choice of indicators which did not allow us to observe the critical effect of alliances on war. With the switch from *already existing* alliance dyads to those *just forming***,** and from wars *underway* to those *just beginning***,** the theoretical "explanation"

of wars by an "invisible hand" becomes meaningless. In the following I will propose an alternative theoretical concept.

Are there far-reaching effects of alliance formations?

Against the tests of causal models that are based on correlations the serious objection of an "ecological fallacy" can be made. If one is counting the number of alliance dyads in the international system in one period and the number of war dyads in the following, and if it happens (whether or not by sheer chance) that these numbers appear correlated across the different measurement intervals, this still tells us nothing about whether or not the corresponding pairs of states are "really" connected. On the basis of a simple analysis of the correlations we do not and cannot know that the same states that are allying are those that are involved in a war later on. It could well be that they are quite different pairs of states (sets of dyads).
There would be no need to worry about an "ecological fallacy," if one could present a kind of mechanism that mediates the impulse between the "cause" and the "effect," or if one could find empirically sustained arguments for some kind of *far-reaching effects* which are introduced by alliance formation throughout the international system. In the following, I will attempt both. Guided by the above confirmed hypotheses of causal relationships between contiguities and war and between alliances and war, I will construct a simple model that allows to trace the spatial and chronological spreading of the bellicose effect of alliance formations through the international system -- if it does in fact exist. What I mean by "spatial" spread will be seen soon. The bellicose effect of alliances will be measured in 3-year periods again, but with the methodological difference that the beginning of these periods is not determined *a priori*, but starts with the very beginning of an alliance dyad in the system.
Alliances are complex human creations, in which at least two states that are approved members of the international system take part, and which are embedded in an environment of other states. According to the views in the literature, alliances which are defense pacts can be a cause of war in several different ways. In the following, I will try to enumerate three different classes of hypotheses about the possible war-effect of alliance formations.

Enhanced likelihood of war between allies

The first class of hypotheses encompasses only the direct relationships between allied nations. The general contention is that the likelihood of war between allied nations is affected by their alliance. This overall effect can be broken down into several different effects and their (hypothetical) causes, and thus is best illustrated by a set of different hypotheses, which are supported by empirical findings.
(i) A few researchers claim that friendly nations (allies) become foes, and this is true sometimes; the hypothesis has been empirically supported. For instance, in his article 'Friends as Foes', James Lee Ray comes to the conclusion that "allied dyads are about two and a half times more likely to become involved in wars with each other, and they are also about two and a half times more likely than not allied dyads to become involved in militarized interstate disputes with each other." (Ray 1990:85)
(ii) Beside the danger that friends become foes, the probability of war between nations that are allied with each other increases by a mechanism which is called "spread of war" and which is almost a logical consequence of the alliance: state A that has concluded a defense pact with state B is obliged to join in a war in which B is embroiled later on. Of course, this is not an absolutely predetermined event, because state A retains the option to decide otherwise; but the empirical

evidence has shown a high degree of reliability between and among allied nations, at least as far as defense pacts are concerned (Conybeare 1992:64-65). It also has been demonstrated often that alliance bonds contribute to the spread of war (Vasquez 1993:234-237). In this case, contrary to case (i) above, both nations are to be found on the same side of the barricade.
(iii) In the next type of cases it is not always clear whether or not the allied and warring nations are on the same side of the fighting. Major powers, especially, are likely to intervene in the internal affairs of their alliance partners, even militarily, when they deem such intervention necessary to maintain or reestablish the stability of a (smaller) allied "brother" nation (Eberwein et. al 1979, Weede 1978).
The first class of hypotheses (i) can be summarized by the formula that dyads of nations that are allied in a certain period of time have a higher probability of war in a following period, namely a war in which they may or may not fight on the same side. Empirically, this hypothesis has to be corroborated by an exploration of the war-proneness of alliance dyads: how many of the alliance dyads are warring dyads in a later time period (i.e. a pair of states that is allied are involved in the same war later on)?

Third party engagement of an ally

The second class (ii) comprises hypotheses that concern the direct effect of alliance formation on war between allied nations and other nations. According to the original Singer and Small hypothesis, there should be an enhanced degree of war in the whole system after the event of consummating an alliance. The question remains theoretically open where this increased probability of war is located. One suspects it could be located between different alliances. But this assumption implies that partners of an alliance are more vulnerable to other nations after concluding the partnership. Realpolitik thinking would, on the contrary, come to the opposite conclusion: the partnership should deter other nations from starting war with members.
Given these more or less plausible--and contradictory--theoretical reasons, it is useful to test the causal influence of alliance partnership on the involvement of at least one of the alliance partners in a war with another nation in a following, but not too remotely following period. To exclude the special effect of the spread of war between allies that we have already discussed, the actual class of cases should be restricted to the war involvement of only one side of a pair of allied nations (one side of an alliance dyad) with a third party, plus those cases of the involvement of both sides A and B with third parties at the same time, but in different wars.

War inducing effect of alliance formations

A third class of hypotheses (iii) comprises the more far-reaching effects of alliance formation. The latter can provoke third party nations to conclude an alliance or to conduct a war against other third parties, for instance, for the purpose of enlarging its domain of influence. In this sense the war between third parties can be thought of as induced by an alliance formation. It should be clear that the alliance formation must be significantly important to the third parties. In the case of near proximity or contiguity, this can be regarded as given.
For the sake of simplicity, the analysis of far-reaching effects of alliance formations will be restricted to neighboring nations alone. The relevant hypothesis is this: The formation of an alliance between A and B causes the onset of war between C and D in a following period, where C or D is a neighbor of A or B. This assumption is sustained by the long recognized link between contiguities and wars between nations. Empirically we have to test the war involvement of third

nations that are neighbors of allied nations. It should also be interesting to expand this test to the war involvement of the neighbors of neighbors of allied nations (second order neighborhood).
So far I have compiled a set of hypotheses on the possible bellicose effect of alliance formations. In short they are located at (i) the direct relationship between allied nations, (ii) the relationship of just allied nations to third party nations and (iii) the relationship between third party nations that are neighbors of allied nations. In class (i) we are, so to speak, in the center of a (hypothetical) war cause, class (ii) takes the direct effects into account, and class (iii) is focused on the spatial far-reaching effects. Methodologically, class (i) means that an alliance dyad is followed later on by a war dyad that consists of the same states (direct successor of the allied dyad, see Fig.5).

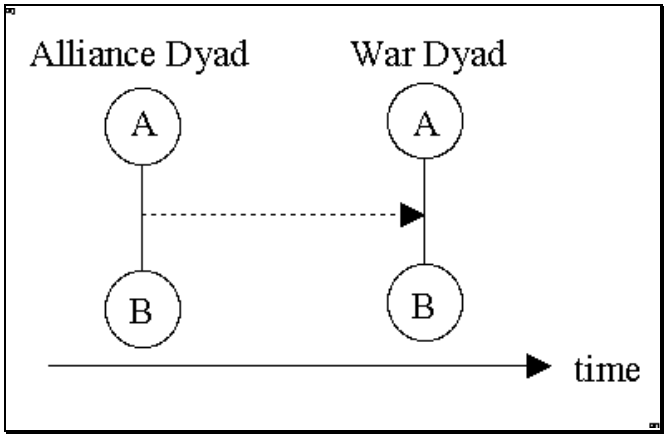

Fig. 5: A War Dyad as Direct Successor of an Alliance Dyad

A bellicose effect on third nations (ii) means that the following war dyad and the alliance dyad are only partly identical: they have one state in common. Metaphorically speaking, an alliance dyad is attracting a war dyad after a certain period of time. Therefore we call the latter an "attracted (war) dyad."

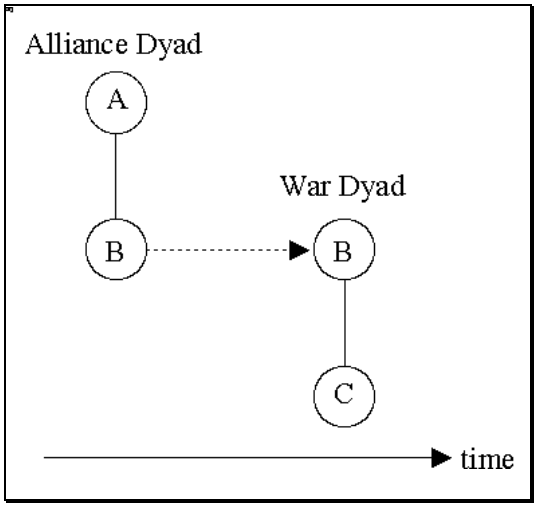

Fig.6: "Attracting" a War Dyad During Time

The direct and the second order neighborhoods of all alliance dyads are determined by the help of the COW-data sets. The examination of class (iii) requires us to ascertain if there are war dyads in the neighborhood of alliance dyads, and which can be regarded as the chronological successors of the alliance dyads.

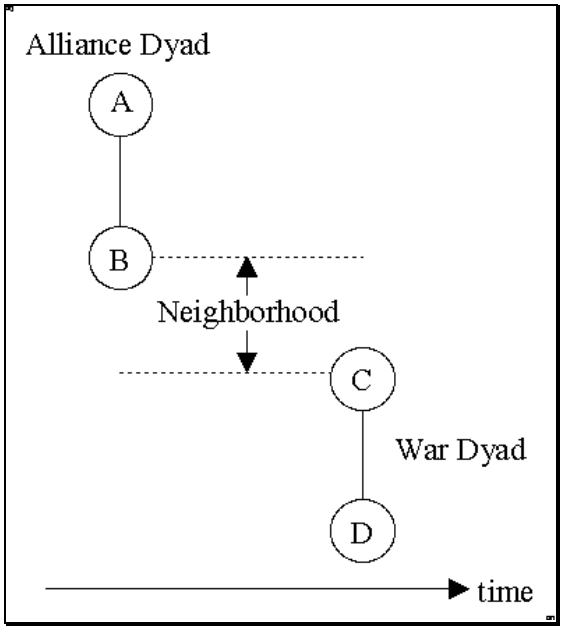

Fig. 7: A War Dyad Shows Up in the Neighborhood

To depict the chronological sequence of the effects, 4 time intervals are used. The first interval (i-1) indicates the wars which began less than 3 years after the alliance formation, the second (i-2) those which began from 3 years to 6 years after, and the third interval (i-3) stretches from 6 to 9 years after. Finally, those war dyads are observed which began in less than 3 years after the termination of an alliance (i-at). These dyads are thought to corroborate the null hypothesis.

Besides the demonstration that there are indeed identical states which are allied with each other and which are involved in war activities after their alliance formation (classes i and ii), the isolation of far-reaching effects according to (iii) is crucial for the application of a correlational analysis on the dyadic level. The latter makes sense only if we can assume that not only the allied nations are affected by an enhanced likelihood of war, but also nations which are not participants of those alliances. In addition, this specific examination is important to the destiny of the invisible hand hypothesis, whose theoretical content could be saved by the concept of *far-reaching effects*. The idea of an "invisible hand" that creates common goods like wealth and peace as unintended side effects of selfish activities is borrowed from Adam Smith and applied to the political realm. Compared to this, the concept of far-reaching effects which is used here appears to be relatively unspectacular and mundane: states are steered by men or women who are observers of at least the near environment of their states, and who are at the same time strategic thinkers and decision makers. This is why states would react to events like alliance formations even though they are not immediately affected.

The empirical evidence

Following are the results of an exploration of the environment of all 2900 (asymmetric) alliance dyads, according to the guiding distinctions made in the former sections. A significant number of all of the (asymmetric) 1802 war dyads could be assigned to the direct, attracted, contiguous, or

second order categories. At first sight, the data build a picture of a kind of corona of war dyads which are surrounding the alliance dyads. For example, the first interval measurement produced the following frequencies, where each percentage includes the previous:

	War dyads
Direct successors	9.0% (162)
Attracted war dyads	53.2% (958)
War dyads in the neighborhood	63.4% (1142)
In the second order neighborhood	68.4% (1232)

Tab.2: The Frequencies of War Dyads

This reads as follows: (a) 9.0% of all war dyads can be regarded as direct successors of alliance dyads that have come into existence; in other words, within 3 years after the alliance formation was carried out by two nations the very same nations found themselves embroiled in a war. (b) 53.2 % of all war dyads can be regarded as "attracted" in the above defined sense, that is, at least one side of these war dyads was joining or forming an alliance the years before joining the war. (c) 63.4% of all war dyads can be regarded as having at least one side (i.e. a nation-state) in the first order neighborhood of an alliance dyad the years before war. (d) The same is valid for the second order neighborhood.

On closer examination, however, many overlapping dyads could be isolated. In the following table only those war dyads are listed which have to be added if we start with the core domain of direct successors and go on to the outer spheres of the "corona," eliminating overlapping dyads in all time intervals:

War dyads	i-1	i-2	i-3	i-at
Direct	9% (162)	3.4% (62)	3.3% (60)	3.4% (62)
Attracted	44.8% (808)	32.6% (588)	29.2% (526)	30.7% (554)
Contiguous	19.6% (354)	30.0% (540)	36.5% (658)	25.2% (454)
second order	3.7% (66)	6.3% (114)	9.4% (170)	9.9% (178)

Tab. 3: The Frequencies of the Different Types of War Dyads

In the first interval and in the core domain of direct followers, the likelihood of war is two and a half times greater than normal (see Ray 1990). But only a very small number of war dyads can be explained by the first class of hypotheses, those involving direct relationships. In the first time interval, the number of attracted war dyads is about 45% of all dyads; this is a significant difference from the 30.7% level of war involvement after the termination of an alliance that serves here as the “normal” war background. The impressive number of war dyads of both direct successor and attracted dyad categories shores up the assumption that the observed correlations do not rely on an "ecological fallacy." This thesis finds additional support when the war dyads are added that are linked to the alliance dyads by first and second order neighborhood. However, the picture is not quite so clear, and especially the numbers of second order contiguities are not very impresive. If we try to interpret all numbers, it appears that starting with the core domain and the sphere of attracted war dyads, a kind of shock wave is spreading throughout the whole international system which reaches its peak with the contiguous war dyads of the third interval, and even draws the second order neighboring dyads into its whirl. But speculation aside, this can be said for certain: the data do not exclude the existence of bellicose far-reaching effects of alliance formations.

Conclusion

At the dyadic level of analysis, the probability that at least one of the two states that concluded an alliance (defense pact) will be involved in a war during the first three years after that event is almost 54%. The enhanced frequencies of war in the first time interval and their fading away afterwards fit exactly the pattern of a causal relationship and its empirical appearance. The choice of indicators, the application of correlational analysis and of the LISREL approach are justified by the account that now emerges of the spread of bellicose effects of alliance formations. It should be clear that I do not exclude the fact that alliances and wars are also dependent on other factors which are capable of partly explaining their correlation. Nevertheless, such a qualification cannot deny the politically relevant fact of the unintended side effects of defense pacts that have been demonstrated here.

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