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The Nature of Borders and International Conflict: Revisiting Hypotheses on Territory

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This study examines the utility of moving beyond a simple "on–off" dichotomous view of contiguous land borders. For each of the 301 contiguous land borders between states in the international system, measures of ease of interaction, salience, and overall border "vitalness" have been developed using Geographical Information Systems technology. These variables are used to test two major extant lines of thought in international relations literature, as well as our proposed alternative, regarding the expected effect of the "nature" of borders on interstate behavior. We conclude not only that the "nature" of contiguous borders matters but also that the relationship between each of the three border measures and the likelihood of conflict is curvilinear concave—with both high ease of interaction and high salience related to lower levels of conflict, and the middle range of both variables related to higher levels of conflict.

The Nature of Borders and Conflict

The location of states, their proximity to one another, and especially whether or not they share "borders," emerge time and again as key variables in studies of international conflict phenomena: from major power general war, to the diffusion of international conflict, to the analysis of peace between pairs of democracies (see, for example, the recent survey by Hensel, 2000). From Boulding's (1962) ideas of "behavior space," "loss-of-strength gradient" (LSG), and "critical boundary" to the simple but profound concern of geographers that humans interact most with those to whom they are closest (Zipf, 1949), there are powerful theoretical reasons to be interested in borders and how they affect international relations.

This article is concerned with the nature of borders because borders operationalize proximity or distance. The spatial context of international politics highlights the importance of location or distance. How far or close—how proximate—actors or units or states are to one another is an important factor in analysis. Borders as a measure of distance or proximity have, however, generally been used as a "discrete or categorical, typically binary" (Gleditsch and Ward, 2001:742) measure. This

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view of distance, as an "on/off" dummy variable, while useful in many studies, is limited because a measure indicating only the presence or absence of a border makes a number of assumptions that cannot be assessed. Our contention is that deeper investigation into the characteristics, or nature of borders, allows us to more closely specify relationships and revisit analyses of territory and conflict in order to produce more accurate descriptions of their relationships.[1] Our investigation of the nature of borders proceeds within the "opportunity and willingness" framework.

Spatiality, Proximity, and Relevance

Dealing with the spatiality dimension of international politics (e.g., see Starr, 2001b, 2003) we are confronted with the question of "distance"—how close or far units are within some concept of space. This is a classic question, raised by many students of conflict, including Boulding's (1962) seminal notion of the LSG, which has been used in many subsequent studies. Two recent reviews of ways to think about and measure distance are Gleditsch and Ward (2001) and Henrikson (2002). Students of international relations have been concerned with distance for two broad reasons, which, conveniently, can be summarized by opportunity and willingness. States (or any other social units) that are close to each other, that is are in proximity to one another, are better able to interact—have the possibility or opportunity of interacting with one another. This is the "interaction opportunity" argument or approach. It derives directly from the work of Harold and Margaret Sprout on "environmental possibilism" (see Starr, 1978; Most and Starr, 1989, chapter 2). One key aspect of borders is that they affect the *interaction opportunities* of states, constraining or expanding the *possibilities* of interaction that are available to them. States that share borders will tend to have a greater *ease* of interaction with one another, and thus will tend to have greater numbers of interactions. Such opportunity might be seen in terms of the *number* of other countries with which any single state has interaction opportunities. It might also be seen in the degree to which such opportunity exists between any particular pair of states. Wesley (1962), for example, argues that the length of a common border between two countries is a better measure of "geographic opportunity" than simply the number of borders.

In addition, states (or any other social units) that are close to each other are also perceived as important or salient to each other, for any combination of reasons. Greater perceptions of threat or gain, or interdependence are ways in which proximity can generate salience. These affect the willingness to interact and to manage subsequent conflicts in different ways.

Any combination of the opportunity and willingness generated by proximity makes states (or other social units) that are close to one another "relevant" to one another. Students of international conflict have structured research designs to include only "relevant" dyads—pairs of states that are able to interact with one another, highly likely to interact, and/or perceive important stakes involved in that interaction (e.g. Lemke, 1995; Leeds and Davis, 1999, or Lemke and Reed, 2001). They have developed studies based on states within politically relevant areas or neighborhoods (e.g., Maoz's (1996); "politically relevant international environment" or PRIE, Enterline, 1998). New work on "network" analyses of various kinds (e.g. Maoz, 2001; Maoz et al., 2002, or Gleditsch's, 2002 "connectivity matrix" analysis) extends the concept and utility of actors that are "relevant" to each other through spatial or behavioral proximity.

[1] In the spirit of Kuhn (1961) we are engaged in the creation of new methods of measurement as a method of "exploration"—where the newly available data can be useful in suggesting additional or original theories or hypotheses.

If we are talking about states, we are talking about *territorial* units. States are proximate to one another in a spatial or geographic manner if their territorial areas are near each other. How close or far are these territorial areas from each other? Are they contiguous? That is, do the territories of two states *touch* each other? Do they *border* each other? If they do not actually touch each other, are they separated by rivers? If they do not actually touch each other, how far apart are they across some other body of water? Thus, borders represent the highest level of proximity—the touching of territory (by dictionary definition, the condition of contiguity.)[2]

It should be clear that territory serves at least two distinct purposes in the study of international relations. First, by defining the territorial political units, territory creates spatial arrangements of the units indicating the physical/geographic distance between those units (which is dynamic, in that the *time-distance* between those units changes with changing technologies of transportation and communication, or with the changes of the arrangements of the units through alliances, or the merging of units through conquest or voluntary integration). Second, as the place where peoples live, territory provides an important component of group identity, and becomes endowed with extraordinary symbolic importance to people.[3] In addition to value based on symbol and identity, territory may also provide real resource value to peoples (arable land, potable water, minerals of value such as gold, uranium, or oil, access to seas or rivers, etc.). Thus, territory takes on value across many dimensions; it is important to people. It both becomes a source of conflict and raises the stakes of any conflict.

The Relationship Between Borders and Conflict

As noted above, in addition to the opportunity for interaction, borders also have an impact on the willingness of decision makers to choose certain policy options, in that they act as indicators of *areas of great importance or salience*. Because other states are close, having greater ease of interaction and the ability to bring military capabilities to bear, these neighbors are also key sources of external cues (or diffusion). Accordingly, activities in these areas are particularly worrisome, can create uncertainty, and thus deserve attention. The notion that changes in bordering areas create uncertainty because of their proximity is based on theoretical and empirical arguments developed by Midlarsky (1970, 1975) and applied in Most and Starr (1980). Starr and Most (1976:10) are also particularly concerned with the "roles that different types of borders appear to play" in conflict. Different types of borders might have differential impacts on both opportunity and willingness. Thus, Most and Starr differentiate borders in terms of homeland borders and borders generated by colonial territories. Implicitly tested in such analyses is the notion that it is homeland territory per se that is important: that the proximity of *any* homeland territory of one state to *any* homeland territory of another state is the important factor.

Part of the considerable research devoted to borders and territory suggests that territorial contiguity—whether through interaction opportunity or as stakes of conflict or both—is a major determinant of whether or not states enter conflicts, and whether those conflicts escalate to war. Indeed, as a significant piece of the war puzzle, Vasquez, 1993:307 suggests that territorial contiguity is the "source of conflict most likely to result in war." However, perhaps simple contiguity may not be the critical factor. Dropping one level of analysis lower, Vasquez (1993) also

[2] For discussions of the conceptualization and measurement of borders, see Starr and Most (1976), or Gochman (1992) as one description of the extensive border data component of the Correlates of War Project.

[3] There is a large and growing literature on identity and geography, particularly as generated by geographers. See, e.g., Agnew and Corbridge (1995), the edited volume by Kliot and Newman (2000), or Newman (1999).

hypothesizes that the *nature* of the border between two states affects the probability that states will go to war. Specifically, he hypothesizes that borders that coincide with natural frontiers (i.e., those borders that are difficult to cross, for example, "high mountains, large bodies of water, or deserts" (1993:310)), those that traverse regions, or are seen as having little value are much less likely to provoke wars than dissimilar borders and border areas (this is a theme picked up later in Lemke's work).

Nonetheless, arguments can be found in the literature to suggest that just the opposite is true. Highly permeable and salient borders may produce qualitatively distinct behavior. For example, the ease of interaction and salience of border areas in north-western Europe has—based on Karl Deutsch's social communication model of integration—most likely contributed to the area moving from high levels of conflict to high levels of cooperation. Relations between states with highly permeable and salient borders have shown a tendency toward interdependence/integration, making military conflict less likely and agreement more likely. For Deutsch, transaction flows were central to the process by which integration took place and security communities were formed. According to Deutsch, countries are "clusters of population, united by grids of communication flows and transport systems, and separated by thinly settled or nearly empty territories" (cited in Dougherty and Pfaltzgraff, 1990:435). The Deutschian study of how countries become integrated focuses on these transaction grids. Continuous communication and transaction linkages are presented by Deutsch as one of nine conditions for the creation of security communities.

Also citing Deutsch, Cobb and Elder (1970:8) go straight to the essential relationship: "The third basic notion from communications theory is the idea that 'transactions flow... establish[es] mutual relevance of actors. An actor with whom you have very much to do is relevant to you...' Given this assumption, the level of interaction, or transaction, between the members of two social units may be taken as a behavioral measure of their mutual relevance." They further observe (Cobb and Elder, 1970:24): "Deutsch . . . finds that all successful security communities have a multiplicity of transaction channels performing a variety of common functions and purposes. Indeed, a high rate of transactional exchange within an area may mean that the community achieves a degree of integration..." The results of Cobb and Elder's empirical study link the exchange of transactions to mutual relevance and then mutual relevance to greater levels of interstate collaboration.[4]

For Russett (1963), the mutual relevance of integration leading to a security community is represented by "responsiveness"—or, ". . . the probability that requests emanating from one state to the other will be met favorably" (Russett, 1974:329). In looking at integration defined as either responsiveness or security communities, Russett (1974:335) finds that transactions describe integration, predict integration, make integration possible, and even cause integration.

Given the role of transactions in Deutschian models of integration, and their potential as indicators of growing interdependence and/or integration, then greater ease of interaction along a border also generates opportunities for positive interaction as well as opportunities for conflict. The latter relationship is central to the Most and Starr (1980) interaction opportunity model, measured simply by the presence or absence of a border.

Thus, two sets of specific testable hypotheses are extant in the literature regarding the impact of the "nature" of borders on conflict. These hypotheses can be phrased as

[4] Highly permeable borders might also indicate the existence of active free markets. A number of analysts have linked free trade with cooperative/peaceful interactions, such as Russett and Oneal (2001) investigating relationships among the elements of the Kantian triad and peace; see also Olson (2000). While trade has also been studied using a gravity model, Starr and Thomas (2002:231–232) indicate that the analyses using GIS to operationalize ease of interaction and salience are not simply reflecting "mass" that is central to gravity models.

- the easier a border is to cross, the greater the likelihood that the border will be a dispute border—Vasquez/Lemke;
- the more salient a border is, the greater the likelihood that the border will be a dispute border—Vasquez/Lemke;
- the easier a border is to cross, the less likelihood that the border will be a dispute border—Deutsch; and
- the more salient a border is, the less likelihood that the border will be a dispute border—Deutsch.

Both sets of hypotheses push scholars to move beyond the simple "on–off" indicator of contiguity. Nonetheless, they postulate mutually exclusive monotonic relationships.

Importantly, notions of cost curves and utility underlie all four of the above-mentioned hypotheses. These are shown in Figure 1. As the ease of interaction increases (opportunity), the costs of projecting a state's power across a border decreases, and thus decreases the costs of violent conflict. Similarly, based on the logic found in Vasquez, the value of highly salient border areas makes an actor's marginal cost of escalating conflict to violence or war (related to willingness) much lower when such territory is threatened, while, on the other hand, low border salience increases an actor's marginal costs of violent conflict. Yet, based on the Deutschian perspective, ease of interaction and border salience are likely to coincide with the development of integration effects. As states become increasingly integrated, the costs of violent conflict—a militarized interstate dispute—between them increases as well.

Complexity has become a turn of the century by-word, and the behavior conditioned by the nature of borders is likely to be anything but simple. Clearly, the identification and analysis of relevant dyads and relevant neighborhoods are important steps forward in testing many extant theories. Willingness is simply not enough; opportunity must also exist. Thus, according to the Vasquez hypothesis, natural frontiers and borders of regions seen as having little of importance are less likely to generate conflict—there is less opportunity and less willingness to fight. However based on Deutschian models, ease of interaction may generate both opportunities for conflict but also integration and therefore *less* willingness to fight. Interestingly and importantly, the *intersection of the two cost curves represents the region with lowest cost* for a militarized interstate dispute. On this basis, we propose that both the Vasquez and Deutschian hypotheses are *independently incomplete*; however, the insights of the two can be combined in a potentially powerful explanatory model. Rather than the relationship between the "nature" of borders and conflict

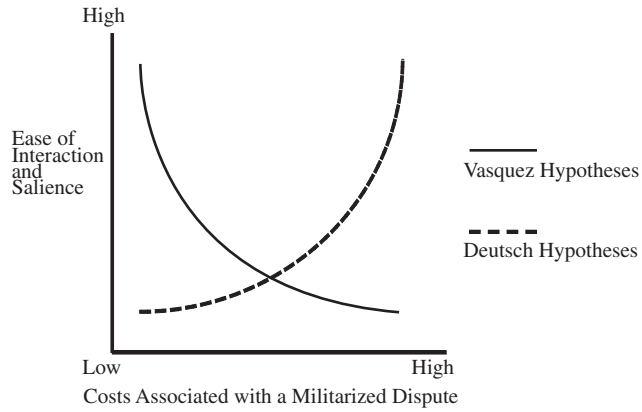

FIG. 1. Contradictory Extant Hypotheses on the Nature of Borders and the Likelihood of Conflict

being monotonic increasing or decreasing, we propose that the relationship is concave: the lowest levels of opportunity and border region salience should correspond to proportionally low incidences of conflict as should the highest levels of opportunity and border region salience, while the middle range of opportunity and salience should have proportionally the highest incidences of conflict. Thus, the analysis that follows tests each of these three rival hypotheses.

Reconceptualizing Borders

This paper continues a project that has applied the use of geographical information systems (GIS) to the study of geopolitics (see, for example, Starr and Bain, 1995; Starr, 2001a, 2002; Starr and Thomas, 2002). Using the opportunity and willingness framework and its ideas concerning interaction opportunities, this project has attempted to reconceptualize borders by creating measures of ease of interaction (opportunity) and salience/importance (willingness).

The GIS project builds upon these two dimensions of borders as indicators of proximity, to revise and reconceptualize how borders may be seen and measured. The global data set derived from the GIS analyses includes 151 states with land borders, which generate 301 separate contiguous land borders between states. Using GIS has permitted a much fuller and clearer specification of borders by allowing us to talk about the *specific qualities* of borders in terms of opportunity and willingness. The GIS methodology, however, must be driven by theoretical considerations. Out of the hundreds of variables found in the 16 data layers of the ARC/INFO GIS (developed by the Environmental Systems Research Institute and based on the 1992 Digital Chart of the World), only a few have been selected for the creation of the two indexes of ease of interaction and salience. This selection has been made in terms of basic theoretical issues found in both the international relations and the geography literatures.[5]

Regarding *opportunity*, the notion of ease of interaction derives from Boulding's (1962) concern with the "LSG," and the ability to project conventional military power. Out of the welter of possible variables (and taking various technical/analytic constraints into account), three central factors for the movement of land-based military capability have been selected—the existence of roads, railroads, and the steepness of terrain. Based on the work of Boulding, Bueno de Mesquita, and Lemke, an index created from these three factors both reflects ease of interaction, and is applicable (and valid) across a large set of international dyadic boundaries. Thus, an index has been created that simply notes the presence or absence of roads and railroads, and represents the hypsography or slope of terrain.[6] This creates a simple combined 1–4 index, with 4 representing the *greatest* ease of interaction, and 1 the most difficult areas to move across. While the GIS is also used to generate maps, which are an important medium for the *visual presentation* of results (see Starr, 2002), more importantly analysts have a way to represent any border (or any section of any border) by a value from 1 to 4: values that can be used in data analyses within the GIS, both with other GIS variables or any other data sets that are imported into the ARC/INFO GIS.

Both the maps and the data set can be used to demonstrate that the ease of interaction *can vary* along any single border that a state might have with a contiguous neighbor, capturing the variation that might occur on a very long border. *Any* particular portion of a border can thus be characterized as to its degree of permeability. Thus, we are able to go beyond the simple "on–off" characterization

[5] See Starr (2002) for a fuller discussion of the nature of GIS, the ARC/INFO system, and the technical aspects of how the indexes were created. One major drawback must be discussed. As noted, the data for this project are from the Digital Chart of the World (DCW), produced for the Defense Mapping Agency in 1992. Thus, the "snapshot" these data provide is time-bound; a major assumption of this project is that the border data generated by the 1992 DCW can be usefully applied backward for 20 years or more, and forward for at least a decade.

[6] Hypsography has been coded into three categories based on slope as follows: 0–5°, 5–20°, and >20°.

of contiguity and go beyond the simple idea that contiguity provides the possibility for interaction. While some parts of some borders would make interaction highly likely or possible, other parts would make it much less likely. We can make such judgments regardless of the length of a border, or the number of different borders that a state might have.

Willingness is represented by the salience dimension of borders. Salience is concerned with the importance or value of territory along or behind a border. Again, the question is how importance/value is to be measured. Here we must be concerned with indicators that would discriminate the level of value or concern over territory. Drawing once more on geographers, demographics are seen as important: the territory on which a state's population lives. This is operationalized by areas of population concentration. A capital city, the locus of governmental activity and the symbol of the state, should also be used to indicate the importance of territory. Note that in selecting areas of population concentration and the seats of government, we have captured all three of the central elements of the state found in the international relations literature: territory, population, and government. Other coverages provide the location of items that indicate the importance of an area. For instance, active civil and military airports are identified, as well as such items as: military camps, forts, oil wells and refineries, power plants of various kinds, water tanks, factories, industrial complexes, hospitals, telecommunications stations, etc. The wide variety of items taken from the GIS are used because the *substantive* importance of any single type of installation can vary considerably across states. By identifying the location of key aspects of a state's transportation, communication, energy production, industrial, agricultural, and security infrastructures, we have items that tap "importance" in a manner generally relevant to all states.

The salience or importance of a border area is determined by places of population concentration, state capitals, airfields, and selected cultural features located within a 50 km buffer of the region's borders. Capital cities are automatically coded with the highest value found in any of the units of analysis. Each feature identified has been given a value based on the number of other features that fell within 4 km of it. These can then be mapped based on the value, showing where clusters arose. The maps provide graphics that represent the numbers of points that overlap within 4 km ranges. Again, any area in a buffer around a border can be characterized by a value from 1 to 4, which can be utilized in data analyses. A four-value scale has been created, with 4 indicating areas of the greatest salience, and 1 indicating those areas with the least. As with opportunity for interaction, this representation of the salience of borders permits us to differentiate whole borders, to differentiate portions of long borders, and to make sense as to why some borders might be seen as more important than others; why changes or events across some borders might generate more uncertainty than occurrences across other borders.

Having generated indexes for ease of interaction and for salience, these have been combined into an index that indicates the existence of what has been called a *vital border*. Recall that Most and Starr (1989) argue that opportunity and willingness are *jointly* necessary conditions for certain types of behavior, and that they are related to each other in complex ways. The core of the vital border concept is that an arc or a border segment may combine high or low values reflecting *both* opportunity and willingness. Again, scores of 4 indicate a high level of "vitalness" with 1 indicating the lowest level for the combined indexes.[7]

[7] Given that both opportunity for interaction and salience were presented as 4-point scales, their joint combined value can run from 2 to 8. For a border to be considered "vital" it must have a joint value of 7 or 8—demanding a value of either 3 or 4 on *each* dimension. Vital borders thus represent areas that are both highly permeable—easy to cross—and also encompass population centers and/or features of economic, political, or social importance. Once more, they are represented by values that can be used in statistical analyses or represented on maps. Examples of such maps (in color!) are provided for Israel's opportunity for interaction and salience, in Starr (2002).

TABLE 1. Hypotheses on the Probability of Conflict Based on the Nature of Borders*

	Border ease of interaction, salience, and 'vitalness'		
	Low	*Medium*	*High*
Vasquez	CONFLICT	CONFLICT	CONFLICT
Deutsch	CONFLICT	CONFLICT	CONFLICT
Starr and Thomas	CONFLICT	CONFLICT	CONFLICT

*The increased likelihood of conflict is visually depicted by an increased font size.

Testing Hypotheses: Conflict and the "Nature" of Borders

Above we introduced two views of proximity, territorial contiguity, and interaction opportunity. The data set that has been generated from the ARC/INFO GIS—with operationalizations of opportunity and willingness as ease of interaction and salience—permits us to evaluate empirically the theoretical claims of the two seemingly distinct bodies of literature and hypotheses. Which finds the greatest support? Or, more interestingly, can both be only partially true? In order to give both sets of hypotheses an equal opportunity and to allow for the possibility that both may be partially true, the border measures have been divided into three categories: borders falling in the lowest 20 percent of weighted measures for ease of interaction, salience, and "vitalness"; borders falling in the middle 60 percent of weighted measures for ease of interaction, salience, and "vitalness"; and borders falling in the highest 20 percent of weighted measures for ease of interaction, salience, and "vitalness."[8] This division should highlight the strengths and weaknesses of the individual extant hypotheses, which we hypothesize will be found on the extremes. However, because of the clumping of cases together at the breakpoints for both salience and ease of interaction (e.g., 24 borders have a weighted ease of interaction measure equal to three), the borders do not divide perfectly into the lowest 20 percent, middle 60 percent, and the highest 20 percent. Nonetheless, an effort has been made to make the categories as close to this division as possible.

The expected outcomes based on each of the hypotheses are shown in Table 1. If the Vasquez hypotheses hold, then one would expect to see the lowest levels of conflict for the lowest 20 percent of cases, and the highest levels of conflict for the highest 20 percent of cases. If the Deutschian integration/interdependence hypotheses hold, then one would expect to see the highest levels of conflict for the lowest 20 percent of cases, and the lowest levels of conflict for the highest 20 percent of cases. Finally, if both hypotheses sets have partial merit, as we suggest, then one would likely see low levels of conflict for both the upper and lower 20 percent but relatively high levels for the middle 60 percent.

[8] The choice of the size of each of the three categories is in part arbitrary. However, one can also examine the distribution of MID borders and non-MID borders—one of the datasets we will be using—for each category and evaluate the validity of any particular choice. If the distribution of MID and non-MID borders in each category approximate one another, then the choice is reasonable. If, on the other hand, either the MID or non-MID borders are clustered near a break point, then a different cut-off point may be more appropriate. This has been checked using a series of box plots, which can be obtained from the authors upon request, for each of the categories and variables: the categories of lowest 20%, middle 60%, and highest 20% for ease of interaction, salience, and "vitalness." The means and the skewness of the distributions are visually very close between MID borders and non-MID borders, and neither the MID nor non-MID borders cluster heavily near breakpoints. Thus, this appears to be a reasonable division for the MID borders. Since the MID borders represent the greater number of cases (91 vs. 22), this division is used throughout the analyses.

Analyses and Discussion

As noted in footnote 5, one major assumption of this project is that the border data generated (from the 1992 Digital Chart of the World) can be usefully applied backward for two decades or so and forward for at least a decade. In other words, we assume that the data retain validity as a rough surrogate for the ease of interaction and salience of areas for this time frame. Therefore, subsets of two conflict data sets have been selected for the analyses based on this time frame. Enduring rivalries found in Goertz and Diehl (1993, 1995) that fall into the broad temporal band covered by the GIS data as well as Militarized Interstate Disputes (MID) between 1981 and 1992 provide two different conflict data sets with which the hypotheses can be tested.[9]

Use of the two different data sets allows one to more thoroughly probe the effects of borders on conflict. Although some overlap exists between the contiguous border conflict dyads identified by both data sets, on the whole, the two data sets are characterized by different types of behavior. The enduring rivalries found in the work of Goertz and Diehl (1993, 1995) represent stable patterns of international conflict involving frequent violent clashes between the protagonists. Alternatively, cases taken from the MID data set represent every MID that takes place across a contiguous land border and has some form of militarized action.[10] Since the focus of the study is the conditioning effect of the nature of contiguous borders on conflict, even though multiple MIDs may exist between the same two countries, the border is simply coded as having been a MID border. This results in 91 different MID and 22 enduring rivalry contiguous land borders. The enduring rivalry dyads allow us to examine frequent escalations to violence between the same parties, while the MID dyads allow us to look at conflict escalation more broadly.

Each of the 301 contiguous land borders has been coded as either being an enduring rivalry border (Yes) or as not being an enduring rivalry border (No). If the borders do not condition enduring rivalry behavior, then the distribution of enduring rivalry borders should be proportional to the distribution of borders as a whole. Specifically, if enduring rivalry behavior is statistically independent of the "nature" of contiguous land borders, then between four and five of the 22 enduring rivalry borders should be in the lowest and highest 20 percent of "vital" borders. Similarly, between four and five of the 22 enduring rivalry borders should fall into the categories of the 20 percent representing the most difficult borders to cross and the 20 percent representing the easiest borders to cross. The distribution of enduring rivalry borders across the categories representing border salience will be the same if, indeed, enduring rivalry behavior is statistically independent of border salience.[11] The Crosstab results for enduring rivalry borders and "vitalness," ease of interaction, and salience are shown in Tables 2, 3, and 4, respectively.

Regarding Most and Starr's (1989) assertion that opportunity and willingness are jointly necessary conditions for certain types of behavior, the presence or absence of enduring rivalry borders appears to be affected by how vital borders are, as shown

[9] Recent enduring rival dyads (Goertz and Diehl, 1993, 1995) include Afghanistan–Pakistan, Algeria–Morocco, Argentina–Chile, Cambodia–Thailand, China–India, China–Russia, Congo–Zaire, Egypt–Israel, Ethiopia–Somalia, Ethiopia–Sudan, Greece–Turkey, India–Pakistan, Iran–Iraq, Iraq–Kuwait, Israel–Jordan, Israel–Syria, Jordan–Syria, Kenya–Uganda, Laos–Thailand, Norway–Russia, North Korea–South Korea, and Saudi Arabia—Yemen.

[10] The analysis uses data from the 1996 version of the Militarized Interstate Dispute data. Specifically, the start year of the dispute had to be greater than 1980, and the highest action of the dispute had to be greater than the coded value of 1. A coded value of one on the highest action in the dispute—i.e., the most hostile action taken—means that no militarized action took place.

[11] Although one might reasonably expect that enduring rivalries would have lower values for border salience, ease of interaction, and "vitalness" because of a substantial history of conflict, using difference in means tests, no statistically significant differences are found between the values associated with enduring rivalry borders and those associated with non-enduring rivalry borders. Indeed, the differences could easily have occurred by chance: $p = .585$ for vital, $p = .758$ for ease, and $p = .232$ for salience.

TABLE 2. Enduring Rivalries and Vital Contiguous Land Borders

	Goertz and Diehl enduring rivalry border		
'Vital' Borders in Three Categories	*No*	*Yes*	*Total*
Lowest 20%			
Count	58	2	60
Expected count	55.6	4.4	
% of total	19.3	0.7	19.9
Middle 60%			
Count	162	19	181
Expected count	167.8	13.2	
% of total	53.8	6.3	60.1
Highest 20%			
Count	59	1	60
Expected count	55.6	4.4	
% of total	19.6	0.3	19.9
Total number of borders			
Count	279	22	301
% of total	92.7	7.3	100.0

$\Pi^2 = 6.935$, $p = .031$.

in Table 2. Of the 60 least vital contiguous land borders in the world, only two are enduring rivalry borders. Proportionally, this is less than half of what one would expect. Similarly, only one of the 60 most vital contiguous land borders in the world is an enduring rivalry border. The probability of seeing this distribution by chance is approximately $p = .031$. Thus, we are indeed led to believe that the "vitalness" of a border affects the likelihood that the border will become an enduring rivalry border. However, neither the Vasquez nor Deutschian hypotheses completely hold. The relationship depicted in Table 2 is the inverted U-shaped relationship that we hypothesized: the combination of constrained opportunity through limited ease of

TABLE 3. Enduring Rivalries and Ease of Interaction Across Contiguous Land Borders

	Goertz and Diehl enduring rivalry border		
Ease of Interaction in Three Categories	*No*	*Yes*	*Total*
Lowest 20%			
Count	58	2	60
Expected count	55.6	4.4	
% of total	19.3	0.7	19.9
Middle 60%			
Count	168	19	187
Expected count	173.3	13.7	
% of total	55.8	6.3	62.1
Highest 20%			
Count	53	1	54
Expected count	50.1	3.9	
% of total	17.6	0.3	17.9
Total Number of Borders			
Count	279	22	301
% of total	92.7	7.3	100.0

$\Pi^2 = 6.018$, $p = .049$.

TABLE 4. Enduring Rivalries and the Salience of Contiguous Land Borders

Border Salience in Three Categories	*Goertz and Diehl enduring rivalry border*		*Total*
	No	*Yes*	
Lowest 20%			
Count	66	1	67
Expected count	62.1	4.9	
% of total	21.9	0.3	22.3
Middle 60%			
Count	157	17	174
Expected count	161.3	12.7	
% of total	52.2	5.6	57.8
Highest 20%			
Count	56	4	60
Expected count	55.6	4.4	
% of total	18.6	1.3	19.9
Total number of borders			
Count	279	22	301
% of total	92.7	7.3	100.0

$\Pi^2 = 4.938$, $p = .085$.

interaction and low salience does reduce the probability of a border becoming an enduring rivalry border, and yet so does the combination of easy interaction and high border salience. The highest probability of a border becoming an enduring rivalry border lies in the middle region, where the *apparent costs of conflict are lowest*.

Turning to the individual effects of ease of interaction and border salience on the probability of a contiguous land border being an enduring rivalry border, we see the same behavior exhibited. One can see in Table 3 that enduring rivalries are less likely than expected to take place across borders with measures of ease of interaction in either the lowest or highest 20 percent. The probability of seeing this distribution of cases by chance if the occurrence of enduring rivalries is independent of the ease of interacting across a border is $p = .049$. Thus, the occurrence of enduring rivalry does appear related to how easy a border is to cross, and the relationship depicted in Table 3 is again the hypothesized inverted U shape. Although the relationship shown in Table 4 is slightly weaker—the probability of seeing this distribution of cases by chance if the variables are statistically independent is $p = .085$—the deviations from the expected values match those predicted by the inverted U-shaped hypothesis.

Therefore, the occurrence of enduring rivalries between parties with contiguous land borders does appear to be directly related to the "nature" of the shared border. Enduring rivalries show a statistical dependence on all three weighted measures of the "nature" of borders developed in the GIS project. Furthermore, the relationship appears to be more complicated than previously hypothesized. Rather than finding a simple monotonic increasing or decreasing function in the data, we have found that the relationship is concave. The greatest likelihood of a border being an enduring rivalry border occurs in the middle ranges of "vitalness," ease of interaction, and salience.

Although the occurrence of enduring rivalries between contiguous parties appears dependent upon the nature of their shared borders, the occurrence of other types of MID between contiguous parties may still be independent of the "nature" of their shared borders. Consequently, this possibility is explored in Tables 5–7. In all three tables, as with enduring rivalry borders, if a contiguous land border sharing dyad has had an MID, the border is coded as "Yes." If not, then the border is

TABLE 5. Militarized Interstate Disputes and Vital Contiguous Land Borders

	Border of a dispute with militarized action		
'Vital' Borders in Three Categories	*No*	*Yes*	*Total*
Lowest 20%			
Count	45	15	60
Expected count	41.9	18.1	
% of total	15.0	5.0	19.9
Middle 60%			
Count	116	65	181
Expected count	126.3	54.7	
% of total	38.5	21.6	60.1
Highest 20%			
Count	49	11	60
Expected count	41.9	18.1	
% of total	16.3	3.7	19.9
Total number of borders			
Count	210	91	301
% of total	69.8	30.2	100.0

$\Pi^2 = 7.574, p = .023$.

coded as "No." The categories for the lowest 20 percent, middle 60 percent, and highest 20 percent remain the same from the previous analyses.

For each of the three variables, the relationship between the nature of the border and militarized conflict behavior is even more pronounced than it was for enduring rivalries. The distribution of cases for the variable "vital" has the highest probability of occurring by chance, $p = .023$. Nonetheless, this probability remains sufficiently low such that one can confidently say that militarized interstate dispute behavior is conditioned by the "nature" of shared land borders. The remaining probabilities are $p = .006$ for ease of interaction and $p = .013$ for salience.

TABLE 6. Militarized Interstate Disputes and Ease of Interaction Across Contiguous Land Borders

	Border of a dispute with militarized action		
Ease of Interaction in Three Categories	*No*	*Yes*	*Total*
Lowest 20%			
Count	45	15	60
Expected count	41.9	18.1	
% of total	15.0	5.0	19.9
Middle 60%			
Count	119	68	187
Expected count	130.5	56.5	
% of total	39.5	22.6	62.1
Highest 20%			
Count	46	8	54
Expected count	37.7	16.3	
% of total	15.3	2.7	17.9
Total			
Count	210	91	301
% of total	69.8	30.2	100.0

$\Pi^2 = 10.197, p = .006$.

TABLE 7. Militarized Interstate Disputes and the Salience of Contiguous Land Borders

Border Salience in Three Categories	*Border of a dispute with militarized action*		*Total*
	No	*Yes*	
Lowest 20%			
Count	54	13	67
Expected count	46.7	20.3	
% of total	17.9	4.3	22.3
Middle 60%			
Count	110	64	174
Expected count	121.4	52.6	
% of total	36.5	21.3	57.8
Highest 20%			
Count	46	14	60
Expected count	41.9	18.1	
% of total	15.3	4.7	19.9
Total number of borders			
Count	210	91	301
% of total	69.8	30.2	100.0

$\Pi^2 = 8.618, p = .013$.

Once again, none of the three tables reveals behaviors predicted either by Vasquez/Lemke or the Deutschian integration models. Rather, each of the three tables shows that MIDs exhibit behavior corresponding to the combination of the Vasquez hypotheses with the Deutschian integration hypotheses. All three tables clearly reveal the hypothesized inverted U-shaped relationship. For example, whereas the expected count of MID borders in the lowest 20 percent of "vital" borders is 18.1, the actual count is 15. Similarly, this is the expected count of MID borders in the highest 20 percent of "vital" borders, while the actual count is only 11. The differences are more extreme for the remaining two variables.

Assuming that the apparent relationships are not spurious, these results suggest a number of important points. First, governments appear less likely to act/react in a conflictual manner (and a *militarized* manner) over low salience border areas. These include borders that exhibit relatively low population concentrations and, compared with the length of the border, a dearth of infrastructure. Strong arguments have been presented by Vasquez (1993), and Huth (1996), among others, that it is territory per se that generates conflict and war, both as the issue over which war breaks out and as a factor that increases the stakes of a war. These arguments are based on the proposition that it is territory—any territory—which creates an opportunity for conflict, serves as the issue for war, and that makes the stakes worth fighting over. Such arguments *are not supported* by the inverted U-shaped findings presented here—especially by the level of conflict found for the lowest 20 percent with regard to salience.

Second, and quite interestingly, in these analyses border length fails as a competing explanation for why governments do not act/react conflictually over low salience border areas: of the 13 MID borders in the lowest 20 percent of salient borders, seven have above average length, while six have below average length. Third, high border salience makes dispute escalation to military conflict unlikely. Governments rely on other means of resolving disputes with countries with which they share neighboring vital border areas. Both of these conditions dampen the probability for escalation to military conflict.

Fourth, Lemke's (1995) or Maoz's (1996) concern for relevant neighborhoods finds moderate support in that governments are less likely to turn to military action

in the face of physical constraints on mobility. Low ease of interaction reduces the probability of a border becoming an MID border. Fifth, the surprisingly low probability of a high ease of interaction becoming an MID border suggests that as cross-border interaction becomes easier, transaction flows are also likely to increase thereby contributing to the creation of a security community. Although other explanations may exist, states appear much less likely to escalate a dispute to military action with neighboring states sharing porous borders.

Given that both ease of interaction and salience have the same effect on conflict behavior, one should not be surprised that these relationships are found in analyzing vital borders. Mirroring the findings for ease of interaction and salience, governmental dispute behavior is affected by the degree of border "vitalness." Neighboring countries sharing less vital border areas likely receive less governmental attention, and fewer meaningful events are likely to occur along such borders, including conflict events. Neighboring countries sharing border areas of high "vitalness" may be seeing an interdependence/integration effect kick in, and also experience lower levels of conflict. As with its two component parts, measures of vital borders falling in the middle ranges experience the highest levels of conflict.

Conclusion

Borders matter. Proximity remains an important conceptual variable in the study of major power general war, the diffusion of international conflict, and crisis behavior. Whether or not states share borders has been a principal means of operationalizing proximity. However, a shared contiguous land border may not adequately reflect the expected underlying behavior. Two different views on the relationship between contiguity and conflict from the literature were presented—each view, however, represented a linear (positive or negative) relationship between them. We proposed a curvilinear relationship, with the low occurrence of conflict at both the lowest and highest levels of ease of interaction (opportunity) and salience (willingness). Conflict is most likely where the expected utility of conflict is greatest—in the middle—where states have both the opportunity and willingness to engage in conflict.

In finding support for our hypothesis we have made two significant contributions to our understanding of the political geography of conflict and cooperation. We have examined and demonstrated the utility of moving beyond a simple "on–off" dichotomous view of contiguous land borders to examine the terrain and human activity along shared border areas.[12] Secondly, we have demonstrated that the relationship between borders/contiguity and conflict behavior is non-linear. *Neither contribution could have been made* using previously collected data on contiguity that simply noted whether or not two states shared a land border. These results could only be possible with the type of data provided by the GIS project on the nature of borders.

Such results provide evidence that scholars should be moving beyond the simple dichotomous "on–off" view of contiguous land borders to look at the nature of shared land borders. This article asks specific questions about contiguous borders—questions that go *unasked* in the literature because it is taken for granted that all we need to know is whether or not two states are contiguous. Our position is that failure to look beyond the presence/absence of shared borders will lead to model misspecification and an overall loss of model power, and thus the simple "on-off" application should not automatically be used. As in Most and Starr (1989) we are stressing the relationship between theory, logic and research design—and arguing

[12]One aim of the GIS project was to go beyond contiguity as an "on/off" indicator, and look at the *nature* of the border, not simply its existence. The creation of the two indexes and the collection of this dataset were to be directed explicitly at the question of whether it was simply territory that affected conflict. The analyses presented here indicate that it is not simply territory. Although a powerful motivator and factor in human relations, when it comes to organized human conflict, territory alone should not be seen as adequate for our analyses.

that understanding the *form of the relationship* between the variables in a model is crucial to developing proper research design. The present "exploration" of new measures, as we called it above, is important to the overall design of the research, which then might affect the choice of specific statistical methods.[13]

A border is not a border is not a border. Territory, per se, is neither a necessary nor sufficient reason for conflict (*a là* one traditional view of territory as the causes/stakes of conflict, exemplified by Vasquez but also such scholars as Goertz and Diehl, 1992), nor does it automatically create greater opportunity for conflict (*a là* Most and Starr, 1980). Some types of borders are dramatically less likely to lead to military conflict than others, while some types are more likely to lead to cooperative activity. Scholars need to account for these differences, and incorporate them into their research designs. Additionally, such analyses need to take place within a broader research context in which space and spatiality play a larger role, one co-equal with that of time. Ease of interaction and salience represent not only opportunity and willingness but also variation across both time- and cost-space. Our findings highlight the importance of incorporating spatial components into the theory and methodology of our research design.

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[13]For specific discussions of how the "form of the relationship" can have a major impact on research design and choice of statistics, see the discussion of Braumoeller and Goertz on necessary conditions (2000; see also the contributions to Goertz and Starr, 2003); and Braumoeller's discussion of causal complexity (2003). For example, in much of the authors' previous work, having a border was seen as a "treatment" which was either present or absent. With the new data, analysts can now ask if the border provides high or low ease of interaction, high or low salience, high or low vitalness. Using these sorts of thresholds, we find many of the same issues of research design and choice of statistics raised in the discussions of necessity and necessary causal relationships noted in the works cited directly above.

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