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Power Parity, Commitment to Change, and War

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Starr (1978) argues that the initiation of war requires both opportunity and willingness. Most theories of international conflict, however, consider only one of these conditions. Power transition theory, which focuses on power parity as opportunity and negative evaluations of the status quo as willingness, is an exception. Although the logic of the theory is compelling and empirical support impressive, the theory suffers from a lack of generalizability, and from inadequate conceptualization and operationalization of evaluations of the status quo. We offer preliminary corrections for both of these weaknesses by (1) depicting the international system as a series of hierarchies rather than as a single hierarchy, thus providing some generalizability; and (2) using extraordinary military buildups to evaluate the relative commitment of the challenger and the dominant power to the modification or maintenance of the status quo, respectively. We argue that the probability of wars between contenders in local or international hierarchies increases significantly when power parity is achieved, presenting the potential challenger with the opportunity to successfully challenge the dominant state, and when the challenger's extraordinary buildup exceeds that of the dominant power, revealing its willingness and commitment to change. Empirical evaluation of the conflict behavior of major power contenders and of a subset of minor power contenders provides strong support for our reconceptualization of power transition theory.

The purpose of this article is to evaluate the proposition that power parity and the challenger's commitment to change are critical variables affecting the likelihood of the initiation of international war between a pair of contenders within the international or within a local power hierarchy. Only when a pair of states are relatively equal in capabilities can both sides in a conflict realistically expect to win; only when the challenger is committed to change is there something over which to fight. We

argue that this proposition applies both to major powers and to minor powers. We also provide a conceptualization of the international system that extends and adapts power transition theory, increasing the scope of its empirical domain as well as its theoretical relevance.

We first outline our modification of power transition theory. Next we discuss operational procedures necessary for empirical evaluation. We then evaluate our model empirically, demonstrating the strength of the connection between power parity and the challenger's commitment to change on the one hand, and international war on the other. We conclude with a discussion of promising directions for future research.

Extension of Power Transition Theory

We are interested in developing a general theory of international wars. In this article, we move in that direction by extending and modifying power transition theory (Organski, 1958; Organski and Kugler, 1980; Kugler and Organski, 1989; Kugler and Lemke, 1996). Power transition theory provides a good starting point for understanding international wars because it considers both the opportunity and willingness of a state leader to wage war. In the original formulation, an evaluation of the status quo determined whether a state would be *willing* to initiate a war. We assume, as did Organski and Kugler, that a dominant state in a system creates economic, military, and diplomatic rules which govern that system. These rules are referred to as the "status quo." We also assume that the creator of these rules is satisfied with the status quo it has created, although other states might not be. Disparate evaluations of the status quo are then one potential source of international conflict. The *opportunity* to initiate war, on the other hand, depends upon the distribution of power. Power parity provides a dissatisfied state the opportunity to act upon its desire to alter the rules of the system and ensures that the satisfied state will take the challenge seriously.

An enormous amount of research has been dedicated to discovering whether there is a relationship between the distribution of power and international war. The traditional wisdom held that a balance of power is associated with peace. Organski (1958) was the first to stridently challenge the claim that a balance of power (with balance defined by him as rough equality) is associated with peace. He argued, in contrast, that preponderance or imbalance is associated with peace, while parity or balance is associated with war. Since Organski's early work, a number of studies of *systemic* power distributions suggest there is no consistent relationship with war (Singer, Bremer, and Stuckey, 1972; Bueno de Mesquita, 1981b; Siverson and Sullivan, 1983; Maoz, 1993). A few scholars report empirical support for the claim that balance is associated with systemic peace (Ferris, 1973; Siverson and Tennefoss, 1984). But, the majority of studies that focus on *dyadic* power relations, those specifically of interest to power transition theory, clearly suggest evidence for an empirical relationship between power parity and war and/or between power preponderance and peace (Garnham, 1976a, 1976b; Weede, 1976; Organski and Kugler, 1980; Houweling and Siccama, 1988; Bueno de Mesquita, 1990; Gochman, 1990; Bremer, 1992; Bueno de Mesquita and Lalman, 1992; Geller, 1993; Maoz, 1993:37).[1] Additionally, Kim (1989) argues that researchers should focus on dyadic

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[1] And yet even a cursory review of modern history suggests that not all wars are fought by nations at power parity. It might very well be that the dyadic relationship between parity and war applies only to what Vasquez (1993) refers to as "wars of rivalry." Such a claim is clearly supported by the empirical evidence offered by scholars such as Organski and Kugler (1980) and by Geller (1993). It may be that while rivals fight when they are roughly equal, nonrivals may also fight, and there is no consistent relationship between power distributions and nonrival wars. Organski and Kugler's and Geller's studies are unable to address this point since they only study wars between rivals. This might limit the generalizability of power parity and war to only wars of rivalry; a potential problem that our study would suffer from as well. Still, wars of rivalry are frequent, serious, and worthy of explanation in their own right.

power distributions augmented by the support potential belligerents expect to receive from third parties. His measure of "alliance equality" is consistently positively associated with the occurrence of war (although not uniformly statistically significant). Kim refers to this as alliance equality, but it is important to note that he is not studying the power distribution between alliance blocs per se, but rather is focusing on dyadic power relations, where the dyad members' capabilities are augmented by expected external support. In this regard his work complements the dyadic studies discussed above.

Although the original formulation specifies both the point in dispute (the status quo) and the likely timing of the conflict (periods of power parity), the theory is limited in two ways. First, the point in dispute is not necessarily unique to the *global* system. We argue that within the global system, there exist multiple regional systems. Within each system, there is a status quo, a set of rules which affect the behavior of the system's members. This status quo may become a source of dispute at both the local and global levels. The extension of the logic of power transition theory to regional systems allows us to consider both major and minor power wars within the same framework.[2] Second, actor evaluations of the status quo have generally been left out of empirical evaluations of power transition theory. Although willingness is clearly a critical element of the theory, most evaluations have focused solely on the specification and evaluation of the opportunity for states to wage war (notable exceptions include Bueno de Mesquita, 1990; Kim, 1991; and Geller, 1994). We argue that extraordinary military buildups indicate disparate evaluations of the status quo, and that the relative size of the buildup indicates each actor's relative commitment to either changing or defending that status quo. These modifications of power transition theory both extend its scope and improve its specification.

Multiple Hierarchies

We argue that the international system is composed of multiple, overlapping systems. The global system encompasses all the states in the world, while regional systems comprise only local members. Within each type of system there is a hierarchy of power and a status quo. Figure 1 illustrates this view of the international system. The power cone suggests a state's international environment depends upon (1) the distribution of power, (2) the number of states at each level of power, and (3) its relevant system (local and global). Each system has its own status quo and group of relevant participants. The relevant participants, or *contenders*, are those states that can affect or impact the status quo of the specific system. There is a set of contenders within the hierarchy of each system.

Every country can exert influence over some amount of territory, but only the strongest states can interact across the entire system. Lesser states can only act locally. As a result, there are local or regional hierarchies, composed of a local dominant country that presides over a local status quo that may be contested by local challengers. For example, country B in Figure 1 is a hypothetical local dominant power that has established a status quo over the countries within the dashed-line area below it. Similarly, country D is a hypothetical dominant country over an even smaller local hierarchy, the dashed line region below it. According to our conceptualization, each of these local hierarchies function as an international system in

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[2] Several scholars have reported extensions of power transition theory to dyads other than the global dominant power and contenders. Organski and Kugler (1980) report power transitions followed by wars in the Middle East, and in Southeast Asia. Houweling and Siccama (1988) and Kim (1989) report a relationship between parity and war amongst all major power dyads. Kugler and Arbetman (1989) report a power transition between Iran and Iraq immediately prior to their war in 1980. We believe that our extension is an important contribution to this literature because we place it within a reconceptualization of the international system such that major and minor power wars are jointly considered within a single study.

miniature (with some important qualifications discussed below). When a local contender committed to changing the local status quo achieves parity with the local dominant country, conflict will likely follow. The members of local hierarchies fight for control of their local relations, just as the major powers fight for control of the international status quo at the peak of the cone.

Power has advantages, of course. Those at higher levels can prey on those beneath them. Country A, the dominant country of the overall international hierarchy, can become involved in all hierarchies should it so choose. However, the reverse is not true; weaker countries cannot prey on those above. Country F cannot realistically challenge A for control over the status quo of the overall hierarchy. This dominance relation is observed at lower levels as well, as country B can interfere within E's local hierarchy, but E cannot interfere with B's. The power cone represents a conceptualization of the international system as a sequence of linked hierarchies, from minor powers to middle powers to major powers. Within each hierarchy the central condition for war is the same: parity and the challenger's commitment to change (this notion of multiple hierarchies is originally developed in Lemke, 1993, 1996). We present this notion of multiple hierarchies as a conceptual extension of power transition theory.

There are some significant difficulties or limitations in the conceptual extension we suggest. The first is the above-mentioned problem of interference by stronger external actors. If Great Powers at the peak of the cone can interfere with the interactions of minor powers in local hierarchies (as both experience and logic suggest), then they might prevent local wars that would otherwise have occurred. They might do this either by deterring dissatisfied local challengers, or by providing other incentives to reduce the local challenger's dissatisfaction. The status quo of the local hierarchy therefore might well be created, defended, or simply affected by more powerful external actors. When such interference occurs, the local hierarchy does not operate in a manner parallel to the overall international hierarchy, since
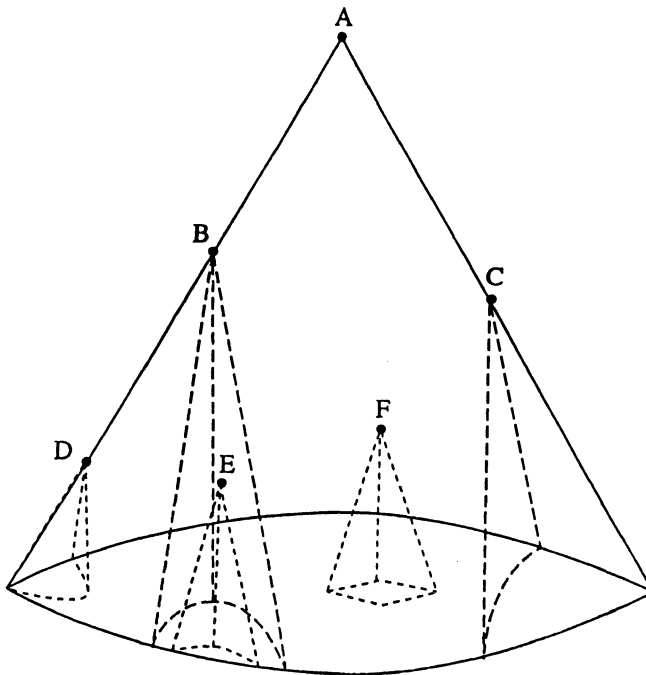

FIG. 1. The international power cone.

local challengers may be prevented from acting on the opportunity and willingness they may have for war. Thus, analyses of power transition theory within this multiple hierarchy framework must give close scrutiny to the possibility of interference.

A second difference between the local hierarchies and the overall hierarchy concerns exactly what constitutes the relevant status quo. According to Organski, the international status quo is an "order" of stabilized relations, such that for satisfied states:

> [E]veryone comes to know what kind of behavior to expect from the others, habits and patterns are established, and certain rules as to how these relations ought to be carried on grow to be accepted. . . . Trade is conducted along recognized channels. . . . Diplomatic relations also fall into recognized patterns. Certain nations are expected to support other nations. . . . There are rules of diplomacy; there are even rules of war. (1958:315–16)

The status quo of the overall hierarchy is thus the rules, norms, and accepted procedures that govern international relations. The status quo of a local hierarchy must operate within the context of this larger, global status quo. This can limit the local status quo such that it might involve only issues that are relevant within a local context. (This would probably not be the case if the minor power region were unimportant to the Great Powers. The less attention paid to the local hierarchy, the more room for autonomy in the local status quo.) One element that is almost certain to be relevant to local status quos is control of territory, secure borders, access to navigable rivers, ports, and so on. Britain as dominant power in the 1870s and 1880s is unlikely to care whether Chile or Peru controls the nitrate-rich Atacama Desert region, so long as nitrate is exported from the region. Thus, the status quo in a local hierarchy centered on the Pacific coast of South America might be "rules" or "norms" limited to stipulating which local actor profits from a certain territory. In other local hierarchies the status quo might concern rights to draw water for irrigation, or some other issue that is of primarily local concern.

Given these two caveats, local hierarchies function in a manner conceptually equivalent to the overall international system in terms of when countries fight wars. Wars are fought in local hierarchies when local contenders, dissatisfied with the local status quo, achieve power parity with local dominant states. In the absence of the opportunity and willingness for war there will be peace. In the absence of parity there may even be a seeming absence of interaction between members of the local hierarchy because the local challenger is too weak to make credible demands from the local dominant power. However, if the local challenger is dissatisfied about some element of its local situation, parity will provide it the opportunity to redress this grievance, and war will follow.

Commitment to Change

As the preceding discussion demonstrates, it is possible to extend the logic of power transition theory to minor power contenders. To do so effectively, however, it is necessary to consider in greater detail the heretofore nebulous but critical concept of the state's evaluation of the status quo. Once the concept is clarified, we must then construct an operational proxy in order to gauge which states are dissatisfied enough to be committed to changing the status quo.

Organski (1958) and Organski and Kugler (1980) argue that a rising state is dissatisfied if the prospective rules of the system that it would like to impose are different "enough" from those already established by the current dominant country. A dissatisfied challenger presented with the opportunity to wage war with a reasonable chance of winning would do so and thus could not be deterred. A rising state is considered satisfied if its favored rules are similar "enough" to those of the dominant country that the costs of war are not worth the marginal adjustment to

the status quo. This suggests that the relationship between war and dissatisfaction, given power parity, can be modeled as a step function where relations are peaceful until dissatisfaction reaches a critical level.

For operational clarity, we eschew use of the term "dissatisfaction" and instead offer the term "commitment to change" in order to highlight the differences between our conceptualization of the challenger's willingness to wage war and that of previous scholars. We argue that the challenger's willingness to wage war is determined not by the *absolute* level of dissatisfaction, but instead by a *relative* evaluation of the challenger's desire for change and the dominant country's desire for stability. Even under conditions of power parity, dissatisfaction merely festers until the challenger's desire for change surpasses the dominant country's pressures and appeals to maintain the status quo. The critical level is thus reached when the challenger's dissatisfaction with the status quo exceeds the dominant country's satisfaction with the same; the challenger is committed to change when this critical level of relative dissatisfaction is achieved. Of course, there will likely be a positive correlation between the absolute and relative levels of dissatisfaction, for it becomes increasingly likely that the challenger's desire for change will exceed the dominant country's desire for stability as the absolute level of dissatisfaction rises. We contend, however, that the relative conceptualization is both theoretically more valid, for it identifies explicitly the critical level, and empirically more robust. (This claim is substantiated by the inferior results derived using absolute dissatisfaction, reported in the Appendix.)

We identify periods when commitment to change obtains by observing extraordinary military expenditure increases, or military buildups, by challengers that exceed the military expenditure increases of the dominant country.[3] A relative comparison of supranormal military buildups between the challenger and dominant state provides an intuitive operational proxy for commitment to change. Domestic or bureaucratic pressures may put upward pressures on military expenditures, but we focus on *extraordinary growth* of military expenditures, which suggests that something other than everyday bureaucratic politics is driving spending. In particular, we suggest that an extraordinary military buildup by the challenger reveals a disparate evaluation of the status quo by the two states. We further argue that the relative size of the two actors' military buildups signals respective commitment to change or stability. The military buildup thus acts as a prewar game of resolve where the two actors attempt to determine the other's level of commitment. If the dominant power reveals a strong commitment to the status quo by building up at a faster pace than the challenger, the challenger learns that peace affords greater benefits than war. If the dominant power cannot demonstrate this level of commitment, however, and the challenger's buildup exceeds that of the dominant state, the challenger anticipates greater benefits from conflict and may then initiate a war.

We claim that an extraordinary military buildup in which the challenger is enlarging its arsenal at a faster rate than the dominant country indicates that the challenger is committed to changing the relevant status quo. There are a number of objections that can be raised in response to this claim. First, even though the military increases are extraordinary (defined explicitly below), they might still be caused by domestic factors rather than by international concerns. It could well be that a regime, faced with unrest at home, increases its military expenditures to promote national pride or unity. We do not dismiss this possibility, but rather suggest that it may actually bolster our claim. Consider: what domestic undercurrents

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[3] One might be tempted to suggest that the use of military buildups is inappropriate because buildups are parts of arms races and "arms races lead to wars." However, there are a number of empirical studies (Altfeld, 1983; Diehl, 1983) as well as formal studies (Intriligator and Brito, 1984) that suggest arms races can lead to either war or peace. Thus, the designation of military buildups as commitment to change does not "stack the deck" for war.

are likely to exist if the citizenry will only be satisfied by military demonstrations, and is willing to risk conflict with rivals (since an extraordinary buildup in one state is likely to be met with comment by others)? It could very well be a pervasive dissatisfaction with local or global position or, more specifically, with the domestic consequences (probably economic) of that position. In short, a populace willing to risk war and supportive of extraordinary increases in military expenditures is more likely to be a populace committed to changing the status quo.

A second possible objection to our claim that extraordinary military buildups represent commitment to change is that even a pair of satisfied states could get involved in military buildups due to misperception in the form of unfounded reciprocal fear of attack. We do not dismiss this possibility either, but argue that it is extremely unlikely to arise. We make this assertion first in reference to satisfied states. Based on Organski's definition of the status quo (quoted above), satisfied states are members of stabilized orders. They accept the rules that govern their behavior as legitimate, and interpret what other states do through a filter these stable relations imply. Thus, if such states were confronted with an aggressive act by another state, it would be more likely that they would misperceive this behavior by *under*emphasizing the threat, since their expectations are of peace and stability. (Of course, this assumes misperception occurs in such an instance at all.) The result would be that the recipient of the aggressive act would *not* increase its military expenditures, and would not be incorrectly defined as committed to changing the status quo. By contrast, a dissatisfied state confronted by aggressive behavior from another state would not refer back to the stable rules and expectations, and would likely increase its military expenditures. This dissatisfied state would be *correctly* defined as committed to changing the status quo. Several other potential problems are raised and discussed in the following section when the specific operational procedures employed for coding states as committed to change are discussed.

Empirical Evaluation

Operational Definitions

As Figure 1 indicates, there is a global hierarchy over all of the states in the international system. There are enormous disparities in power in this global hierarchy, and thus only the very strongest of states can compete to be the global dominant country. We restrict our analysis of behavior in the global hierarchy to the power and conflict relations of the global or Great Power contenders (defined below). In order to consider behavior in the local hierarchies, further operationalization is required, and this is a bit more complicated.

A minimum requirement for identifying local hierarchies is the establishment of the set of countries a minor power state can interact with militarily. Ideally, one would find evidence of interaction of all kinds between minor power states, and thereby define local hierarchies. Although ideal, such a procedure would make daunting empirical demands, and thus would be a major research project in itself. Therefore, at least as a preliminary effort, we opt for defining sets of minor power states as local hierarchies if they can interact militarily. These sets of states that can interact militarily are almost certain to include local hierarchies that would be defined by the more rigorous ideal procedure, but are also likely to include sets of states that can interact, but do not. Such sets of states are unlikely to have anything over which they disagree and are thus unlikely to fight each other. This should tend to produce a lot of cases in which our dependent variable (war/no war) takes on a zero value. The substantive implication of this is that care must be used in interpreting our results as saying as much about the conditions associated with peace as they do about the conditions associated with war.

In defining local hierarchies as sets of countries that can interact militarily, the important conceptual components are power and distance. Thus, in order to define the local hierarchy within which a minor power operates, it is necessary only to determine the area of the cone in Figure 1 over which each country exerts influence. We accomplish this by employing Bueno de Mesquita's (1981a) operationalization of Boulding's (1962) loss-of-strength gradient, suitably modified to more closely represent minor power realities.[4]

The loss-of-strength gradient is used to determine how much of a given country's power is lost in transit between it and a potential target country. The formula can be used to determine a country's area of influence if information about national power share, available transportation technologies, and terrain types to be crossed are provided. Such data are available in various encyclopedias, statistical abstracts, and atlases. Once assembled, they can be used to determine how much of a country's power would be spent in transporting personnel and material to other countries. Raising a country's power share to Bueno de Mesquita's exponent results in a smaller number. The difference between the original power share and the now smaller adjusted power share represents the amount of power lost in transit. Prespecification of the amount of power loss that would make a potential target country unreachable allows the delineation of the area of the power cone (Figure 1) in which a given country can exert military influence. When a group of two or more minor power countries can interact with each other militarily, we define them as constituting a local hierarchy. (For a more detailed discussion of this procedure see Lemke, 1995.)

The minor powers that we consider in this analysis are those located in South America. We include these minor powers because they have been independent for a long period of time, and have been relatively isolated from major power interference.[5] South America is an interesting minor power region for a study such as this one for other reasons. First, the large number of MIDs (ninety-one in the 1984 version of the MID data set) suggests that war in South America has been a very real (albeit rarely realized) possibility. This is similar to Weede's (1976) justification for his study of preponderance and peace in East Asian dyads. Second, the South Americans fight very few wars (two during the 120 years of this study) in contrast to the Great Powers. Thus, it is important to see if the same "causes" can be found for wars in relatively peaceful local hierarchies as in the relatively bellicose global hierarchy. Finally, at least one other scholar (Gochman, 1990) has analyzed the war behavior of Latin American states, and thus his results can serve in comparison with ours.

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[4] The formula Bueno de Mesquita offers is:

$$\text{Adjusted Capabilities} = \text{Capabilities}^{\log[(\text{miles}/[\text{miles per day}])+(10-e)]}.$$

For a full description and justification of the formula and its component terms see Bueno de Mesquita (1981a:103–8). The "suitable modifications" mentioned refer to our belief that the "miles per day" component of the exponent must be determined specific to the time and place in which the potential initiator would move its forces. Bueno de Mesquita assumes standard transit capabilities for all states within specified time periods. We modify this by attempting to assess exactly how much distance states could traverse per day. This assessment is based on the records of missionaries and explorers who actually covered these distances using the transportation then available. For a full discussion of the procedure employed see Lemke (1995).

[5] As mentioned above, major power interference in local hierarchies adds additional complexity to the question of minor power wars. There is evidence to suggest that South America has been relatively free of interference. Eckhardt and Azar (1978:87–88) report that major power interventions have been disproportionately rare in South America. Further, we compiled a set of militarized interstate disputes (MIDs) in which South American countries are identified as the principal actors on both sides. Of the ninety-one MIDs so identified, not a single one was characterized by participation by any state located outside the region. It seems reasonable to suggest that while outsiders may have intervened in South American *intra*state conflicts, they have not interfered with South American *inter*state conflicts. (The same phenomenon is reported by Hensel, 1994:fn. 2, for Latin America as a whole.) There is additional evidence of major power indifference toward Latin America reported in various diplomatic histories of the region (Kiernan, 1955; McLynn, 1979; Ortega, 1984; Abente, 1987).

Using the operational definition of local hierarchy offered above, we identify four, mostly dyadic, persistent local hierarchies in South America from 1860 to 1980. After 1970 transportation opportunities offered by a continental highway system allow virtually all South American states to interact with each other militarily, so for the last decade of our study we expand the number of South American dyads within local hierarchies significantly. For the bulk of the period of study, however, the local hierarchies are: the Atlantic Coast (Argentina, Brazil, and Uruguay), the Pacific Coast (Chile and Peru), the landlocked states of the interior (Bolivia and Paraguay), and the Northern Rim (Colombia, Ecuador, and Venezuela). Additionally, Peru can reach Ecuador militarily, although the reverse is not true; Chile and Peru can reach Bolivia, although Bolivia cannot reach either of them; and Argentina and Brazil can reach Paraguay, although Paraguay cannot reach either of them. Thus, the countries in the interior local hierarchy potentially can be interfered with by members of other local hierarchies. The frequent dispute dyad of Argentina and Chile is not defined as mutually reachable until the 1920s, after which it constitutes a fifth local hierarchy. This dyad's lack of war prior to the 1920s is consistent with expectations based on our definition of local hierarchies. After the 1920s, the lack of war is consistent with our theory, since the weaker member was never committed to change as they moved toward parity.

The next operationalization involves identification of which countries to consider. Recall that we define contenders as those countries that have the ability to affect the status quo of the international or local hierarchy of interest. The status quo of the overall international hierarchy can only be changed by the most powerful major powers. By definition, the dominant country is always a contender. The other contenders are identified by ranking all major powers according to their capabilities. We then observe where the largest unit drop in capabilities occurs. Major powers above this point are identified as contenders for the overall international hierarchy. For example, a set of hypothetical major powers and their capabilities might look like: state A: 100 power units, state B: 90 power units, state C: 85 power units, state D: 40 power units. The largest unit drop is from state C to state D. Thus, states A, B, and C are the contenders.[6] Additionally, we preserve Organski and Kugler's (1980:43) criteria that in order to be a major power contender, the country in question must be involved in major power interactions, identified by alliances with other major powers. Thus, a major power without any alliance ties to other major powers is not considered a contender regardless of its power. For the minor powers the identification of contenders within each local hierarchy is identical. The only difference in operationalization at the minor power level is that alliance ties are not considered. This is because South American countries have formed virtually no alliances with each other, and thus if alliances are necessary for contender status, there would be no minor power contenders.[7]

We believe that this "largest unit drop" definition of contender status is justified since we are really interested in the strongest of states within each system. However, in order to demonstrate that this selection does not stack the deck in favor of our theory, we also present all of the results below with an alternate selection criterion. In this alternate criterion we simply include the strongest state in each hierarchy with every other member of the hierarchy. In this way more cases of preponderance

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[6] The most powerful contender at the beginning of the decade is the dominant country, the others are challengers. If two states begin the decade at rough parity (within 80 percent of each other) they both are identified as dominant with reference to the other Great Powers. In comparing these two dominant countries with each other, whichever was more powerful in the previous decade is the dominant country.

[7] For the minor powers the contenders within the local hierarchies are: Argentina, Brazil, Chile, Colombia, Peru, and Venezuela 1860–1980, and Bolivia and Paraguay 1900–1980. For the major powers the contenders are: the United Kingdom 1820–1980, France 1820–1980, Prussia/Germany/West Germany 1820–1980, Russia/USSR 1820–1980, United States 1950–1980, Japan 1970–1980, and China 1970–1980.

are added. As can be seen, and as discussed below, the results change very little with this change in contender definition. In the analyses below the "largest unit drop" definition is reported as "Contender Dyads," while the alternate definition is reported as "All Dyads."[8]

In order to identify contenders who are committed to changing the status quo, it is necessary to determine who is undergoing an extraordinary military buildup. This is accomplished for any given decade by comparing the average annual change in military spending (using the military expenditure data included in the Correlates of War project's Composite Capabilities Index) for a state during that decade with the average annual change in military spending for that state prior to the decade in question. The comparison is thus between the average increase in the decade and the cumulative average of all previous years. When calculating the cumulative overall average we want to eliminate any year in which the country in question was involved in serious fighting against either domestic insurgents or another country. At the same time, we do not want to eliminate years with low-intensity conflicts that would be unlikely to meaningfully affect military expenditure levels. What we need is a sensitive exclusion of *more* severe war years from our calculations. We employ a specific 7,500 casualty criterion, based on consideration of several casualty levels reported in Horn (1987).[9] Whenever the average annual military increase within a decade is greater than the cumulative annual average for all previous years the state is coded as undergoing a military buildup. This military buildup is interpreted as an indication of absolute dissatisfaction.

To determine whether the critical level of commitment to change has been reached, it is necessary to compare the challenger's spending behavior with that of the dominant state, or, in our terms, to compare the challenger's commitment to change with the dominant state's commitment to maintaining the status quo. The challenger is coded as committed to change when its extraordinary military expenditure increase for the decade in question minus the dominant country's military expenditure increase for the decade is greater than zero.[10] The challenger is thus committed to change when it is undergoing a buildup and additionally is outstripping the dominant state in military expenditures. While military preparations are necessary for both attack and defense, the relative size of the buildup reflects the ability of each country to transfer resources to military purposes, and thus reflects the resolve of each potential belligerent to preserve or change the status quo. (For

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[8] For the global hierarchy the "All Dyads" category is all Great Power dyads that include the dominant country. Theoretically, this should include *all* states in the international system paired with the dominant country. We omit this more comprehensive classification because we have data only for South American non–Great Powers. We know that all combinations of South American states with the dominant country were cases of preponderance and that there were no wars. This list of dyads would tend to support the argument we are making that parity and commitment to change are strong correlates of war. Thus we exclude this partial set of major-minor dyads in order to ensure a more difficult test of our argument. We anticipate more comprehensive evaluations in the future.

[9] The data for casualties from internal or international war are drawn for the major power contenders from Horn (1987). For the minor powers they are drawn from Small and Singer (1982), and Richardson (1960).

[10] In order to ensure that the challenger's buildup is connected to the dominant power–challenger relationship, we stipulate that there be at least one militarized interstate dispute (Gochman and Maoz, 1984) between the challenger and dominant country within either the decade under consideration or the previous one. This allows us more confidence in connecting the challenger's military expenditure behavior to its relationship with the dominant state. This concern is similar to those in the arms race literature about the extent to which the behavior of two countries is specifically linked.

One of our reviewers expressed the concern that by including the occurrence of a MID between the challenger and dominant state we might be selecting only war fighters into our set of dissatisfied contenders, and thus stacking the deck in favor of our theory. This is a serious concern, but one we think is potentially relieved by consideration of Goertz and Diehl's (1992:159) evidence that the probability of war for dyads with one dispute is only 0.069. Of course, the Goertz and Diehl analysis also indicates that as the number of MIDs within a dyad increases the probability of war increases dramatically. It is likely that many of our contender dyads experience multiple MIDs, but our stipulation is only that there be at least one MID between contenders, and therefore does *not* guarantee that all contenders committed to change fight wars.

a fuller description of the operational procedures involved see Werner and Kugler, 1996).[11]

A possible objection to the validity of this measure and procedure is that the dominant state might begin with an arsenal so much larger that it has a margin of safety and need not make any increases in order to feel secure in its ability to defend the status quo. The primary response is that the instances in which we are especially interested in identifying challengers committed to change are when parity is present or is approaching. In such situations the basic resource bases of the challenger and dominant state are nearing equality. If the dominant state does in fact have a larger arsenal to begin with, it must have created that arsenal to ensure its safety. The rising challenger must be seen as a threat to that security, especially if it is undergoing a buildup. Thus, the dominant state would be expected to desire to increase its arsenal to return to its previous level of military comfort. In order to do so it must increase arms expenditures in order to offset the increases of the rising state. If the rising state is committed to change it must realize this, and will strive to close the weapons gap with its might-be opponent. Since the two states are roughly equal in raw capabilities, they should be able to contribute similar amounts of resources to their arsenals. Thus, there is meaning in arms expenditure increases over and above what one's could-be opponent is able to achieve. Given the threat of war (produced by parity or approaching parity) a larger arsenal is likely not sufficient to guarantee the dominant state's comfort. Further, it is uncommon for wars of rivalry to be short. Generally they are extended and require rearmament, or the creation of a wartime economy with a substantial military sector. Thus, should war come, an initial armament advantage for the dominant state may guarantee the ability to hold out in the present; it does not guarantee this for the long term. All of these factors give the dominant state incentives to increase its military expenditures, and make the comparison of expenditure increases relevant.[12]

Almost certainly there are residual problems with gauging an international attitude by any specific behavior. However, there are compelling conceptual reasons to accept the validity of extraordinary military buildups as an indicator of commitment to change. We argue that this is especially the case when parity is present or nears.

The next operational choice concerns how to define power parity. Unlike other work that builds on power transition theory, we do not focus on transitions per se.

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[11] A number of alternate measurements of evaluations of the status quo have appeared in recent work. Kim (1991) operationalizes the challenger's evaluation of the status quo by computing its tau-b alliance score (Bueno de Mesquita, 1975) with the dominant state, arguing that if the challenger and dominant state have similar alliance patterns, the challenger is satisfied. Conversely, if the challenger and dominant state have sharply different alliance patterns the challenger is likely dissatisfied. We do not make use of Kim's operationalization because the minor powers we include in our study have not had many alliances, and thus their alliance profiles provide no useful information about their attitudes regarding the status quo. Bueno de Mesquita (1990) operationalizes evaluation of the status quo using the value of a country's money in international financial markets. He argues that if a country's currency is decreasing in value that country is dissatisfied. We do not use this operationalization because it is difficult to view one minor power as dissatisfied with its local status quo based on its currency's performance in European financial markets. Finally, Geller (1994) measures evaluations of the status quo in purely dyadic terms, focusing on territorial arrangements and stated efforts to change specific foreign policies of the other dyad member. Although conceptually related, we do not consider such dyadic status quos here, since we focus on systemic and subsystemic status quos. (In the smallest local hierarchies, of course, the subsystemic and dyadic status quo are identical.)

[12] Another possible objection might be that significant changes in the average size of military establishments over time could produce what appear to be many contenders committed to change in the end of our time period, few in the beginning. We overcome this potential problem by looking at average annual changes in arms expenditures. Thus, even though the total military expenditure of state X might be significantly higher in 1970 than in 1870, the change from 1970 to 1971 will be comparable to that between 1870 and 1871. By looking at average annual changes we de-trend the series. Evidence that this is so can be seen by the fact that the correlation between year and annual expenditure change is only 0.0289.

Additionally, one might be tempted to argue that transferring resources to the military component of power is evidence of weakness elsewhere. This may be the case at some points in time, but is certainly not true during periods of parity when the resource base of the contenders is roughly equal.

We believe that Thompson (1983:99) is correct in claiming that the logic of power transition theory does not allow one to argue persuasively that the war should be expected immediately before *or* after the transition. It is the condition of parity that is important theoretically, not transitions. Further, we define parity as a range of roughly equal power values, and argue that this rough equality provides the opportunity for war.

We operationalize parity by comparing the ratio of the challenger's power to that of the dominant country over ten-year intervals. We measure power in two ways. The first employs Gross Domestic Product (GDP) for major power contenders, and GDP multiplied by a measure of political capacity developed elsewhere (Lemke, 1993) for minor powers.[13] In order to ensure that our results are not driven by the measure of power employed, we also measure power with the Correlates of War project's Composite Capabilities Index. In this second analysis the COW share for major powers measures their national capabilities, while for the minor powers we again weight their power score by their political capacity. The analyses that follow report results using both measures of power.[14]

Eighty percent parity between the challenger and dominant state seems to be the standard previous investigators have used to operationalize parity. We generally use this criterion below, but have also run our analyses with 70 percent and 90 percent as the parity thresholds. In the logit analyses that follow we employ a continuous measure of static power parity, which is simply the ratio of the weaker to the stronger state.

In addition to this static operational definition of parity we include a dynamic version. Rather than simply comparing the power of the challenger to that of the dominant power over a ten-year period, we ask whether, over that same ten-year period, the challenger's power relative to the dominant state's increased such that parity was achieved or an actual transition occurred. We thus specify a series of dichotomous dynamic variables each indicating whether the relationship crossed a 70 percent, 80 percent, or 90 percent threshold of parity. The dynamic parity results are reported below along with the static ones. Perhaps not surprisingly, there is great similarity between the dynamic and static analyses.

Finally, we operationalize our dependent variable, war, by consulting standard lists of international wars (Wright, 1965; Small and Singer, 1982) and selecting those entries that involve the dominant state and a contender.[15] The list of wars relevant to our analysis include: the War of the Pacific and the Chaco War for the minor power contenders, and the Crimean War, Franco-Prussian,[16] and both eastern and

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[13] GDP sources include: Maddison (1991) for the major powers, and Maddison (1989) for the minor powers. An extensive list of sources was used for additional minor power GDPs; see Lemke (1993: app. 2). The measure of political capacity used compares the central government's actual revenues with what could be expected in revenue, based on level of development. The empirical procedure follows Organski and Kugler (1980).

[14] In performing these analyses we noted a rather high correlation between GDP and COW ($r = 0.8497$). We noted a similarly high correlation between these measures and that employed by Doran and Parsons (1980). Using factor analysis we uncovered a single factor (eigenvalue 2.61106) that accounted for 87 percent of the variation across these three indicators of power. Further, all three power measures loaded on this factor at a level of at least 0.899. We employed this factored power score as a third alternate measure of power, and noted no substantive differences. Below we report the results only for GDP and COW power scores in order to save space, but the results from the analyses employing this factored power score can be obtained by writing the authors.

[15] This identification is similar to one that Organski and Kugler (1980) adopt, but with two improvements. First, they include any conflict involving a major power on both sides. We stipulate that relevant wars involve a contender against the dominant power. Since the contention is that wars at the top of the hierarchy are fought for control of the relevant status quo, it is important to focus solely on the contenders and dominant power because only they can reasonably expect to vie for control at this level. Second, Organski and Kugler argue that relevant wars must have battle deaths higher than those of previous wars in order to ensure that "both major powers involved made an all-out effort to win . . ." (1980:46). It could be that battle deaths were higher in previous wars due to inferior medical practices or perhaps due to poor decisions of field commanders. In order to avoid such misinterpretations, this casualty criterion is omitted in our designation of wars.

western fronts of the two world wars for the major power contenders.[17] Although our analysis includes only a few wars, our sample n is much larger because we focus on dyad-decades as our unit of observation. As a result, our model should help us to anticipate not only when wars between contenders occur, but also when they will not.

Local hierarchies are operationalized by calculating the effects of distance on capabilities. The challenger's commitment to change is operationalized by observing extraordinary military buildups. Our argument is that major power contenders contest the status quo of the overall international system, fighting only when parity between the dominant state and a challenger committed to change is observed; and that minor power contenders contest the local status quo of local hierarchies, fighting only when rough parity between the local dominant country and a local challenger committed to change is observed. Empirical evaluation of our hypothesis that major and minor power wars follow the same pattern is presented below, but first we provide some indicators of the validity of two of our operational procedures.

Assessing the Validity of Local Hierarchies and Commitment to Change

Two of the operational procedures used in this study are relatively new, and may therefore require additional validation before some readers will accept them. Specifically, we consider in this section whether the division of South America into four local hierarchies is consistent with South American history, and what our commitment to change measure indicates in regard to specific countries.

Earlier political science efforts to identify regional groupings of countries placed all of Latin America in a single unit (Russett, 1967; Wallace, 1975). It is difficult to think of Latin American states interacting in this comprehensive way, especially in earlier time periods. However, one might well ask whether the division of South America into four sets of *potentially* interacting states does not err in the opposite direction. In response, we discuss some interesting precedents for our local hierarchies.

The first is a rather intriguing "regional classification of primitive peoples" by Quincy Wright (1942:545). The specific classifications for South America indicate regions of ethnic, cultural, and economic similarities that bear strong resemblance to the areas of the four local hierarchies identified here. This suggests the terrain of South America circumscribed interactions among "primitive peoples" (assuming, reasonably, that the similarities listed above indicate interaction) much as it has among modern South American states. Another intriguing parallel is drawn by comparison of our regions with the map of colonial South America. The viceroyalty of New Granada, the viceroyalty of Peru, and the viceroyalty of the Río de la Plata correspond almost perfectly to three of our local hierarchies, although there was no corresponding interior viceroyalty or even captaincy-general.

There is also evidence of plausibility of our designation in various diplomatic histories of South America. Upon perusing this literature, one is struck by how several authors organize their works along the divisions advanced here (see, Davis and Wilson, 1975; as well as Bethell, 1984–92, esp. vols. 3 and 8). More persuasively, many authors write in terms similar to those employed here. Burr (1955:40) writes

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[16] When we use GDP to designate Great Power contenders France is observed to be at parity with England in the 1860s and early 1870s. Consequently, France is a dominant country during this time period and is paired with each contender—including Prussia. This is not the case when we use the COW index to designate contenders. Thus, the Franco-Prussian War is only included in those analyses that employ GDP.

[17] Note that the Pacific theater of WWII is not included. This is because neither Japan nor the United States satisfies our criteria for being a contender. As a result, this conflict is not a contender war, and by our definition cannot be explained by our theory.

of a "balance of power system . . . in the area of the Río de la Plata . . . ," as well as of a "balance of power on the Pacific coast . . ." between Chile and Peru (p. 42). In a later work he discusses specific South American rivalries, all of which are located within one or another of our local hierarchies (1970:101). Ortega (1984:373) writes of the War of the Pacific arising from a "natural and inevitable rivalry . . ." between Chile and Peru. In a pair of articles about the López War (McLynn, 1979; Abente, 1987) no mention is made of any involvement by states outside the Atlantic Coast local hierarchy, indicating that this event was of interest exclusively within Brazil and Argentina's area of competition. Davis, Finan, and Peck (1977:133) tell us that following the War of the Pacific "Bolivia . . . tended to look eastward . . ." ultimately to war with Paraguay. The only local hierarchy for which no similar parallel can be found in the diplomatic history literature is the Northern Rim, although it does appear as a distinct "primitive peoples" region and as a viceroyalty.

There appears to be a variety of types of evidence to support the division of South America into four local hierarchies. The reader may also be interested to know what kind of face validity our measure of commitment to change possesses. Figure 2 indicates German commitment to change from the 1820s until World War II. It shows:

$$[German(Decade\ Avg. - Cumulative\ Avg.)] -$$
$$[Dominant\ Country(Decade\ Avg. - Cumulative\ Avg.)].$$

Thus, when the line crosses above zero Germany is committed to changing the status quo. Germany is classified by our measure as committed to change in the 1860s (the decade that ended as the Franco-Prussian War began) as well as from 1900 onward (corresponding to efforts to change the status quo in two world wars). This is all consistent with historical interpretations of Germany as a dissatisfied state.
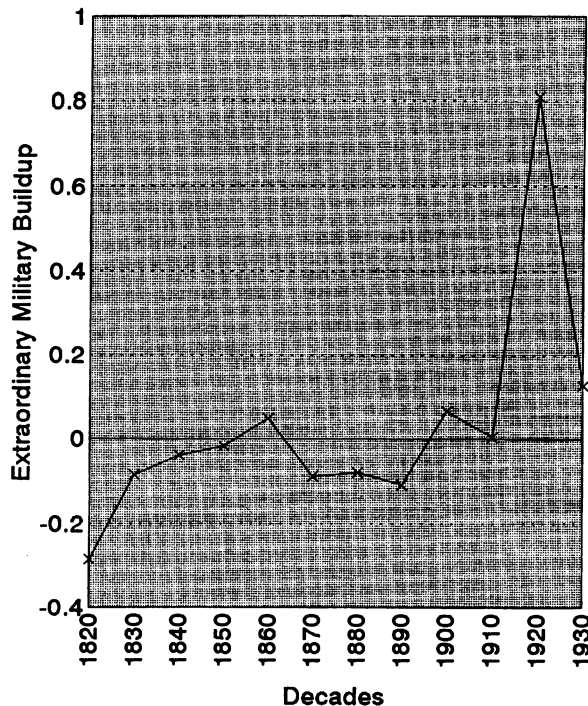

·FIG. 2. German commitment to change, 1820s–World War II.

Figure 3 indicates the general absence of commitment to change of a generally satisfied state, France. Note that the values for France are consistently negative throughout the nineteenth century. Only in the early twentieth century does France evince commitment to change. This could either be representative of French displeasure at her decline relative to other contenders, or be an instance in which our measure incorrectly classifies a satisfied state as dissatisfied. At any rate, this commitment to change does not manifest itself until France is far too weak to initiate a war against the dominant country. Figure 4 shows a similar situation for Russia in the nineteenth century, but note that Russia/Soviet Union is committed to change throughout the twentieth century. This is certainly consistent with Soviet history, and probably with most interpretations of the latter days of the Romanov dynasty. Figure 5 indicates the validity of this measure for a minor power, Paraguay. This figure shows Paraguay relative to Bolivia in the same way as Germany, France, and Russia are compared to the overall dominant country. The figure indicates that Paraguay was committed to changing its local status quo in the 1890s, but most importantly in the 1920s and 1930s, a period overlapping with actual warfare against Bolivia.

These figures are intended to demonstrate when our measure designates specific contenders as committed to change or not. The patterns are indicative of a certain level of plausibility for all states, although only these four instances are shown in order to save space. The patterns are reasonably consistent with standard interpretations of the attitudes of these states, and thus illustrate the plausibility of the measure. In the next section we combine this measure with power parity to determine how well it accounts for the incidence of wars.
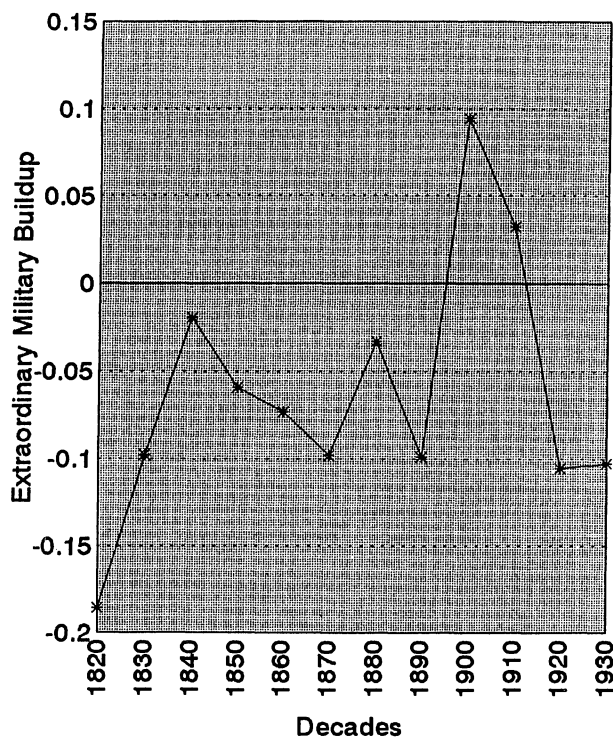

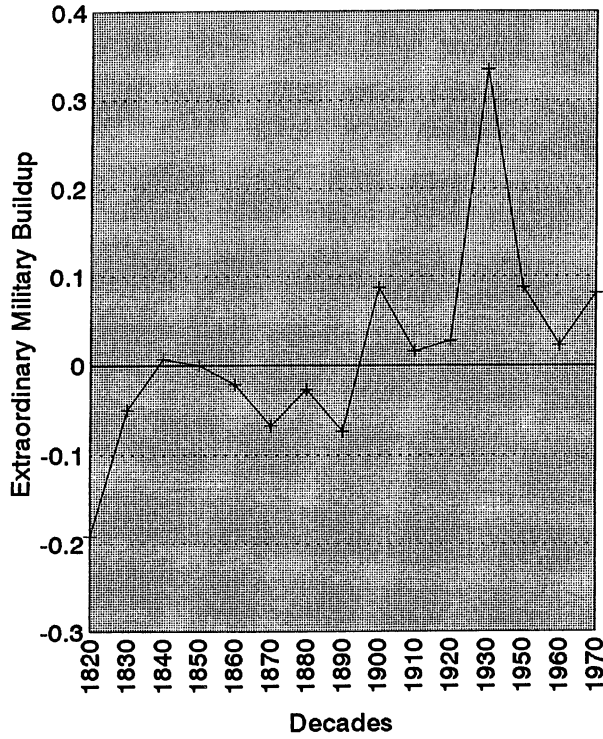FIG. 3. French commitment to change, 1820s–World War II.

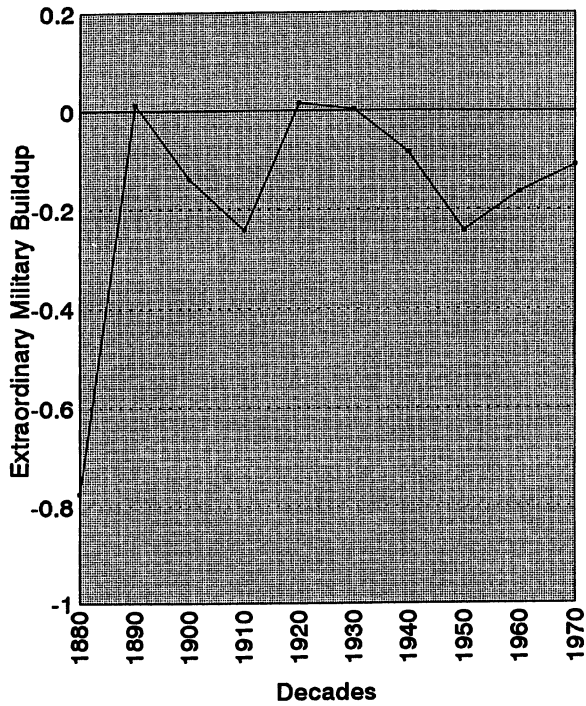FIG. 4. Russian/Soviet commitment to change, 1820s–1970s.

FIG. 5. Paraguayan commitment to change, 1880s–1970s.

Empirical Results

Our unit of analysis is contender dyad, observed for each decade in our study period. The relevant variables are the distribution of power within the dyad, the challenger's commitment to changing the status quo, and the presence or absence of war between the two countries. Our hypothesis is that parity and challenger's commitment to change greatly increase the probability of war between contenders within the local and overall international hierarchies.[18] For the major power contenders the time frame is 1820–1980, while for the minor powers data availability limits us to a time frame of 1860–1980. In our analyses, the incidence of war is correlated with, as well as regressed upon, the independent variables for each dyad decade. The hypothesis is tested against a nonrandom sample of countries, and thus statistical significance does not have the usual interpretation. Statistical significance is reported below in an effort to determine how likely it is that we would have discovered a relationship as strong as that reported had we sorted the cases into the categories of the dependent variable randomly rather than according to the values of our independent variables.

As a preliminary step we present Tables 1 through 4. In Table 1 we report the relationship between static power parity and war for both GDP and COW power data for the contender dyads identified by the largest unit drop in capabilities. In Table 2 similar results are reported for the set of all dyads that include the dominant state. Tables 3 and 4 provide similar results for the dynamic versions of our parity variable.[19] Previous empirical studies of power transition theory (Organski and Kugler, 1980; Houweling and Siccama, 1988) test only for parity. These first four tables replicate their results, and indicate that there is a relationship, albeit a generally weak one, between parity and war.

TABLE 1. Static Power Parity and War (Contender Dyads)

	GDP				COW	
	No Parity	Parity			No Parity	Parity
No War	94	59	No War		109	33
	116	37			123	19
	131	22			131	11
War	0	8	War		2	5
	2	6			3	4
	5	3			6	1
	Tau B					
1st row (70% = parity)		0.27				0.23
2nd row (80% = parity)		0.25				0.26
3rd row (90% = parity)		0.14				0.05

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[18] Since this article extends power transition theory there are a number of alternate hypotheses we could consider. These include the timing of war between contenders and whether the challenger is the initiator of the conflict. These are valid hypotheses which merit evaluation in their own right. We hope to address them in subsequent work.

[19] Note that the number of cases changes from table to table. There are a number of reasons for this. First, for some dyads we do not have both measures of power for the same periods of time. Second, we designate relevant contender dyads using the countries' shares of power. Different definitions of power occasionally place the largest unit drop between different countries. This can lead to different dyads being counted for the same time period. Another consequence of the different power data sets is that occasionally one data set will indicate that there are two dominant states (i.e., a contender at parity with the dominant country) and this changes the dyads included. Results for the "all dyads" specification (i.e., dominant state with all others) report more wars than for the "contender" specification. These are "wars" such as Russia–Japan 1905, Russia–Austria 1914, and so on, which involve the dominant state (in this case a country at parity with the dominant state) and an opponent that is below the largest unit drop in power.

TABLE 2. Static Power Parity and War (All Dyads)

	GDP			COW	
	No Parity	Parity		No Parity	Parity
No War	191	61	No War	186	33
	215	37		200	19
	230	22		208	11
War	5	8	War	8	5
	7	6		9	4
	10	3		12	1
	Tau B				
1st row (70% = parity)		0.18			0.15
2nd row (80% = parity)		0.18			0.17
3rd row (90% = parity)		0.11			0.03

TABLE 3. Dynamic Power Parity and War (Contender Dyads)

	GDP			COW	
	No Parity	Parity		No Parity	Parity
No War	108	37	No War	110	28
	112	33		114	24
	116	29		121	17
War	3	5	War	2	5
	3	5		2	5
	4	4		2	5
	Tau B				
1st row (70% = parity)		0.18			0.26
2nd row (80% = parity)		0.20			0.29
3rd row (90% = parity)		0.16			0.35

TABLE 4. Dynamic Power Parity and War (All Dyads)

	GDP			COW	
	No Parity	Parity		No Parity	Parity
No War	205	38	No War	185	29
	210	33		190	24
	214	29		197	17
War	7	6	War	8	5
	8	5		8	5
	9	4		8	5
	Tau B				
1st row (70% = parity)		0.18			0.16
2nd row (80% = parity)		0.15			0.19
3rd row (90% = parity)		0.12			0.24

Perhaps more dramatic is the relationship between parity and war that is uncovered when static parity is treated as a continuous variable (the ratio of the weaker to the stronger state), as it is in Tables 5 and 6. Here we present logit analyses of the relationship between power parity as a continuous variable and the incidence of war for both the contender dyads (Table 5) as well as all dyads that include the dominant state (Table 6). Each table reports both static and dynamic measures of power parity. As can be seen from these tables, specifically from the 1st difference calculations, a one-unit change in the continuous static power parity variable increases the probability of war as much as 49 percent (see the first column of Table 5), while a one-unit change in the dichotomous dynamic power parity variable increases the probability of war as much as 46 percent (see the fourth column of Table 5). Clearly, power parity is an important correlate of war within contender dyads.[20] Additionally, all of the coefficients have the expected positive sign, and small standard errors. Finally, the pseudo-R^2s indicate that this single variable accounts for a reasonable amount of the variation in war, specifically in contender dyads.[21]

TABLE 5. Power Parity and War: Contender Dyads (Logit Analyses)

| | GDP Data | | | COW Data | |
	Static	Dynamic		Static	Dynamic
Constant	–7.60	–3.62		–6.12	–4.75
Coefficient	6.31*	1.73*		4.91**	3.29**
(S.E.)	2.71	0.76		1.92	1.10
1st difference[a]	0.49	0.35		0.47	0.46
Model χ^2	12.34**	5.40*		9.04**	14.08**
pseudo-R^2	0.25	0.12		0.20	0.30
n	161	153		149	149

* indicates p < 0.05; ** indicates p < 0.01
[a] This represents the change in the estimated probability of war given a change from 0 to 1 in the independent variable.

TABLE 6. Power Parity and War: All Dyads (Logit Analyses)

| | GDP Data | | | COW Data | |
	Static	Dynamic		Static	Dynamic
Constant	–5.15	–3.27		–4.26	–3.31
Coefficient	3.62**	1.38*		2.89**	1.85**
(S.E.)	1.25	0.60		1.08	0.59
1st difference[a]	0.47	0.30		0.44	0.36
Model χ^2	10.18**	4.64*		7.40**	8.57**
pseudo-R^2	0.13	0.06		0.11	0.13
n	265	256		232	231

* indicates p < 0.05; ** indicates p < 0.01
[a] This represents the change in the estimated probability of war given a change from 0 to 1 in the independent variable.

[20] In Tables 5 and 6, as well as in Tables 10 and 11, the dynamic power parity variable employed reports the standard 80 percent parity threshold. Using the 70 percent threshold variable leads to marginally better results in Tables 5 and 6, while using the 90 percent threshold leads to slightly weaker results. Specific results can be obtained from the authors.

[21] The pseudo-R^2s reported in all tables are the Aldrich and Nelson version corrected for the fact that our dependent variable's modal category ("no war") includes 95 percent of the cases. See Hagle and Mitchell (1992) for an especially good discussion.

Our other hypothesized correlate of war between contenders is the presence of an extraordinary military buildup (commitment to change). Tables 7 and 8 present contingency analyses of the relationship between commitment to change and war, while Table 9 presents logit analyses of the relationship between commitment to change and war for both GDP and COW generated dyads, and for both the "contender" and "all-dyad" selection procedures. Note that commitment to change is generally a stronger correlate of war than is power parity based either on the tau B statistics from Tables 7 and 8 or on the higher average 1st difference calculations in Table 9. Additionally, the pseudo-R^2s are generally higher. As was the case with Tables 5 and 6, the coefficients all have the expected positive sign, and very small standard errors.

In Tables 10 and 11 we combine the two independent variables into one predictor of war. Since our hypothesis is that parity and commitment to change jointly are powerful correlates of war, these tables fully represent our argument. The results here most strongly support our hypothesis. The Model χ^2s indicate significant

TABLE 7. Commitment to Change and War (Contender Dyads)

	GDP Designated Dyads			COW Designated Dyads	
	No Commitment	Commitment		No Commitment	Commitment
No War	142	14	No War	133	14
War	2	6	War	2	5
	Tau B = 0.43			Tau B = 0.39	

TABLE 8. Commitment to Change and War (All Dyads)

	GDP Designated Dyads			COW Designated Dyads	
	No Commitment	Commitment		No Commitment	Commitment
No War	236	18	No War	207	16
War	7	7	War	7	6
	Tau B = 0.33			Tau B = 0.31	

TABLE 9. Commitment to Change and War (Logit Analyses)

	GDP Data			COW Data	
	Contenders	All Dyads		Contenders	All Dyads
Constant	−3.86	−3.52		−4.20	−3.39
Coefficient	3.01**	2.57**		3.17**	2.41**
(S.E.)	0.76	0.59		0.88	0.61
1st difference[a]	0.45	0.43		0.46	0.42
Model χ^2	16.22**	16.81**		14.23**	13.21**
pseudo-R^2	0.29	0.21		0.30	0.19
n	165	268		154	236

* indicates p < 0.05; ** indicates p < 0.01
[a] This represents the change in the estimated probability of war given a change from 0 to 1 in the independent variable.

proportional reduction in error, the 1st difference calculations attain their highest average values as do the pseudo-R^2s, the coefficients have the expected positive sign, and the models as well as all variables are statistically significant. These statements are true for the dyads based on GDP or COW power indicators, for static as well as dynamic measures of power parity, and for the "contender" as well as "all-dyad" selection procedures. These results are clearly very robust.

TABLE 10. Static Power Parity, Commitment to Change and War (Logit Analyses)

| | GDP Data | | | COW Data | |
	Contenders	All Dyads		Contenders	All Dyads
Constant	−3.91	−3.56		−4.29	−3.41
Coefficient	4.01**	3.68**		4.51**	3.59**
(S.E.)	0.96	0.79		1.11	0.81
1st difference[a]	0.48	0.48		0.49	0.47
Model χ^2	17.24**	18.71**		18.38**	16.91**
pseudo-R^2	0.34	0.23		0.38	0.24
n	163	266		154	236

* indicates p < 0.05; ** indicates p < 0.01
[a] This represents the change in the estimated probability of war given a change from 0 to 1 in the independent variable.

TABLE 11. Dynamic Power Parity, Commitment to Change and War (Logit Analyses)

| | GDP Data | | | COW Data | |
	Contenders	All Dyads		Contenders	All Dyads
Constant	−3.65	−3.34		−3.88	−3.21
Coefficient	4.34**	4.03**		4.17**	3.49**
(S.E.)	1.00	0.93		0.96	0.84
1st difference[a]	0.49	0.48		0.48	0.47
Model χ^2	18.98**	18.03**		18.15**	15.25**
pseudo-R^2	0.37	0.22		0.37	0.21
n	164	268		155	238

* indicates p < 0.05; ** indicates p < 0.01
[a] This represents the change in the estimated probability of war given a change from 0 to 1 in the independent variable.

Our theory suggests that the proper functional form is that presented here, namely, a multiplicative combination of parity and commitment to change. However, the results are not sensitive to functional form. We replicated Tables 10 and 11 employing an additive functional form in which parity and commitment to change are separately included in the equation. Generally, the results are virtually the same for the additive specification. The only exception is that the various parity variables usually only attain a level of significance of 0.10. These results persist whether the continuous measure of parity or the various threshold variables are used, are insensitive to which measure of power is employed, and persist whether the "contender" or "all-dyad" selection procedures are employed.

Whether one focuses on the contingency tables or the logit analyses, the results support our hypothesis that power parity and challenger's commitment to change greatly increase the probability of war within contender dyads.

A central part of our argument is that the relationship between parity and commitment to change on the one hand and war on the other applies to the interactions of minor as well as major power contenders. All of the results reported above aggregate the major and minor power contender dyads. It is thus not immediately clear that the empirical results obtain for both sets of dyads. In order to ensure that our results are not driven by one set of dyads, we replicated the analyses in Tables 10 and 11 including a control variable for whether the dyad in question was composed of Great Powers. The inclusion of this control variable had virtually no effect on the coefficients reported in Tables 10 and 11 for the impact of parity and commitment to change on war. However, the control variable itself had a positive, statistically significant impact on the initiation of war. Given what we know about the greater propensity for Great Powers to participate in as well as initiate wars (Bremer, 1980), this result is not surprising. In order to further explore the strength of the hypothesized relationship across sets of contender dyads, we replicated the results reported in Tables 1 through 9 separately for Great Powers and minor powers. In virtually every case the reported relationships did not change. It was rare, however, that the coefficients for the minor power analyses obtained standard levels of statistical significance. This may be because there are only two instances in which the dependent variable takes a nonzero value amongst the minor power dyads. This paucity of variation makes sophisticated analysis difficult at best. In order to show something of the strength of the relationship between parity and commitment to change with war at both levels we present Table 12, which is a cross-tabulation of a dichotomized version of the independent variable from Table 10.[22] Clearly the relationship between the joint presence of our independent variables and the incidence of war is present at both the major and minor power contender levels.

TABLE 12. Contingency Analysis of Static Power Parity, Commitment to Change and War, Differentiating Between South American and Great Power Contender Dyads

	South American Dyads			Great Power Dyads	
	Joint Parity and Commitment			Joint Parity and Commitment	
	No	Yes		No	Yes
No War	110	9	No War	23	5
War	0	2	War	2	3
	Tau B = 0.41			Tau B = 0.35	

This analysis is based on COW power data. The two cases of war in the absence of joint parity and commitment for the Great Powers are the dyad of U.K. and Russia during the Crimean War, and the dyad of Germany and the Soviet Union in World War II.

Implications, Conclusions, and Directions for Further Study

The results of this study suggest that major and minor power wars are fought when the same situations obtain. Whether we are dealing with the most powerful countries in the world or the relatively weak states of South America, power parity provides the opportunity to act for those who are committed to changing the status quo. What is especially appealing about the results reported here is that a single theoretical framework is used to account for war at both major and minor power levels. In

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[22] Table 12 employs the Correlates of War definition of power, and the "Contender Dyad" selection procedure. Additional test results that separate the analysis into different sets of major or minor power contender dyads can be obtained from the authors.

addition, by measuring evaluations of the status quo by the challenger, and including them in the empirical evaluation, the tests reported above are of the fully specified theory.

That said, however, a certain amount of caution in interpreting the findings is necessary in light of the preliminary nature of this study and specifically of the small number of cases included in the analyses. With very few instances in which the contender dyads actually went to war our results are certainly sensitive to specific cases. Had just one or two of the wars *not* occurred, we would likely have found no relationships between the variables. The wars did occur, of course, and thus while we are confident in our results, we recognize that additional tests extending our efforts to other local hierarchies or longer time periods are necessary before we can claim that the multiple hierarchy version of power transition theory allows us to anticipate the initiation of war in a more general sense. We would point out, though, that our results are consistent across cross-tabulations as well as logistic regressions, across different measures of power, across different thresholds of power parity, across both static and dynamic definitions of parity, and for the major power as well as minor power contenders. We consistently find that power parity and challenger's commitment to change have a positive, significant, and generally sizable impact on the incidence of war in such dyads. In future work we will extend our analysis to other regions in an effort to determine if the multiple hierarchy model of power transition theory has the empirical power we expect it does, and that our results here tentatively suggest it does.

While providing a unified theoretical statement supported by empirical evidence is very desirable, it is also possible to offer some implications from this effort that address other studies. First, by focusing on a specific type of military arms increase it is possible to say something about the debate over whether arms races lead to war. We find that extraordinary military buildups are especially dangerous near parity if the challenger is winning. Conversely, if the dominant power is outspending the challenger, then this buildup situation is not dangerous. This implication accords with Weede's (1980) response to Wallace's (1979) work on arms races and war; under some circumstances arms buildups are dangerous, while under others they are not.

Of course, this article represents only the first part of a larger process of theory revision. In order to increase the robustness of our results a number of modifications are planned for the future. Work is progressing toward developing a measure of major power interference in minor power local hierarchies. South American local hierarchies are used here because the region has been independent for a long period of time, and largely free of major power interference in *intraregional* affairs.[23] More contentious regions such as the Middle East are likely to be significantly affected by major power interference. This interhierarchical interaction has to be explicitly considered in future work.

Similarly, our measure of commitment to change seems to perform well as a preliminary measure, but needs refinement. Within the context of parity it seems clear that an extraordinary military buildup represents commitment to changing the status quo, but what about in the absence of parity? In cases of preponderance, what can be inferred from an extraordinary military buildup by the weaker party? Perhaps the most we can say is that this variable measures commitment to change during times of parity, but not during times of preponderance, and that the absence of an extraordinary buildup does not necessarily indicate satisfaction with the status quo. Still, identification of dissatisfied contenders at or approaching parity is an accomplishment.

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[23] It is possible that the component of the results reported here for South America might be contaminated by major power interference, but if so it is a very strange coincidence that the Great Powers interfered in South America in such a way that conflicts only occur when there is parity and challenger commitment to change, and otherwise do not occur.

Finally, although by using the multiple hierarchy model of power transition theory a lot can be said about both major and minor power wars, little or nothing can be said about asymmetric conflicts. Our theoretical structure does not allow us to make claims about the conditions under which a major power will make war on a minor power, or vice versa. This is a clear area for theoretical improvement in the future.

We have provided a single theoretical statement that consistently accounts for wars among major powers and among minor powers. We have included a fully specified test of our theoretical statement, and have also addressed some of the literature debating whether arms races lead to war or peace. Our theoretical revision provides a powerful and parsimonious tool for anticipating the initiation of wars between contenders. The evidence amassed here suggests that major and minor power contenders fight when power parity and commitment to change on the part of the challenger are present.

Appendix

As discussed above, a challenger is coded as committed to change if and only if it is engaged in a military buildup, and if this buildup involves greater increases in military expenditures than those of the dominant power. This comparison between the buildup rates of the two countries makes our measure of commitment to change a measure of *relative* dissatisfaction. The challenger has to be dissatisfied *enough* to be committed to change before we expect war. One might wonder whether this criterion is really necessary? Is not *absolute* dissatisfaction on the part of the challenger enough for war? We believe it is critically important to determine whether the challenger is committed to changing the status quo, that is, is relatively as well as absolutely dissatisfied. There is empirical justification for this distinction also. Table 13 uses the challenger's buildup regardless of consideration of the dominant state's military increases, as an anticipator of war. This measure of absolute dissatisfaction is an inferior predictor of the probability of war compared to the results reported in Table 9. Relative measures are preferable on theoretical as well as empirical grounds.

TABLE 13. Absolute Dissatisfaction and War (Logit Analyses)

	GDP Data			COW Data	
	Contenders	All Dyads		Contenders	All Dyads
Constant	−4.09	−3.51		−11.20	−3.77
Coefficient	1.69	0.94		8.72	1.32
(S.E.)	1.07	0.66		35.87	0.78
1st difference[a]	–	–		–	0.29
Model χ^2	3.60	2.32		7.02**	3.67*
pseudo-R^2	0.08	0.03		0.16	0.06
n	158	257		148	228

* indicates $p < 0.05$; **indicates $p < 0.01$
[a] This represents the change in the estimated probability of war given a change from 0 to 1 in the independent variable.

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