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The Offensive/Defensive Balance of Military Technology: A Theoretical and Historical Analysis

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This study examines various attempts to define the concept of the offensive/defensive balance of military technology, to trace the theoretical consequences of an offensive or defensive advantage, and to measure or classify the balance for the last eight centuries. It is concluded that the last two tasks are flawed because of the ambiguity of the concept of the offensive/defensive balance. There are multiple definitions and multiple hypotheses, but these are not interchangeable, particularly between the pre-nuclear and nuclear eras, where the concept means something fundamentally different. Hypotheses appropriate for one definition may be implausible or tautological for another. It is concluded that the notion of the offensive/defensive balance is too vague and encompassing to be useful in theoretical or historical analysis, but that some of the individual variables that have been incorporated under this broader concept may themselves be useful. Much more analysis is needed, however, to demonstrate that these concepts have important theoretical consequences.

The literature on international relations and military history contains numerous references to the offensive or defensive balance of military technology and its impact on war. Historians often characterize a particular era as favoring the offense or the defense, and theorists often hypothesize that technology favoring the offense increases the likelihood of war or contributes to empire-building. More generally, it has been suggested that the history of warfare and weaponry can be viewed in terms of the interplay between the offense and the defense (Snow, 1983:83). These analyses are not generally meaningful, however, because they are rarely guided by any explicit definition of the key concept of the offensive/defensive balance. The concept itself has been defined in a variety of ways which are often contradictory and which confuse the meaning of the hypotheses in question. Attempts to classify the balance historically are also inconsistent. These inconsistencies are obscured by the failure of both the theoretical and historical literature to acknowledge and build upon earlier scholarship and also by the absence of any general review of the literature. As a result, little is known about the offensive/defensive balance and its impact on war.

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Much more work needs to be done if the concept of the offensive/defensive balance is to have any utility for explaining international conflict. This work must begin with a critical assessment of the existing literature in order to synthesize and evaluate the numerous but disparate and generally superficial treatments of the concept. Three aspects of the problem which are integrally related but which are often treated separately in the literature must be incorporated: hypothesis construction, concept definition, and historical measurement.

The Hypotheses

One of the first attempts to generalize about the consequences of either an offensive or defensive balance was that of Clausewitz (1976:293), who suggested that the superiority of the defense may leave both sides with no incentive to attack and thus 'tame the elementary impetuosity of War.' More explicit propositions were made by the proponents of the 'qualitative principle' in the 1920s and 1930s. Their argument that offensive and defensive weapons can be distinguished and that the former (and only the former) should be abolished was based on the explicit assumption that offensive but not defensive weapons are conducive to war, an assumption shared by most of the participants at the 1932 League of Nations Conference for the Reduction and Limitation of Armaments (Wheeler-Bennett, 1935; Boggs, 1941). Hart, for example, wrote that 'any strengthening of the defensive at the expense of the offensive is a discouragement to aggression' (1932:72).

A more systematic attempt to delineate the consequences of the offensive/defensive balance of military technology was suggested by Wright in his classic *A Study of War*. He argues that the superiority of the offense generally results in the following: an increase in the probability of war; political expansion, unification, and empire building; a decrease in the number of states in the system; and shorter duration and lower costs of wars. Superiority of the defense, on the other hand, results in a strengthening of local areas and thus facilitates revolts, the disintegration of empires, and the decentralization of states; an increase in the number of states; decrease in the decisiveness of wars and their importance for world politics; strategies of protracted stalemates and mutual attrition, which result in wars of longer duration and greater destructiveness (Wright, 1965:129, 292-93, 673, 797, 1520). Similarly, Andreski (1968:75-76) argues that

other things being equal, the predominance of the attack over defence tends to diminish the number of independent governments within a given area and to widen the areas under their control, and/or facilitates the tightening of control over the areas already under their domination; while the superiority of defence tends to produce opposite results.

One can find similar generalizations in Quester's *Offense and Defense in the International System* (1977). He writes that: 'Offenses produce war and/or empire; defenses support independence and peace' (p. 208). When the offense holds the advantage 'both sides are primed to reap advantages by pushing into each other's territory, (and) war may be extremely likely whenever political crisis erupts' (1977:7). Offensive superiority is conducive to empire and a 'final political decision' while defensive superiority leads to political independence and prolonged wars (1977:8,31,208). Quester recognizes the complications introduced by nuclear technology, and argues that the capability for a counterforce offensive encourages war while a countervalue offensive capability promotes peace (1977:69).

Gilpin also devotes attention to the relationship between the offense and the defense. He argues that: 'Military innovations that tend to favor the offense over the defense stimulate territorial expansion and the political consolidation of international systems by empires or great powers' (1981:61). Gilpin also argues that the offensive/defensive balance affects the costs of changing the *status quo*, and that the higher the costs the fewer incentives for war (1981:60-62). This is similar to Bean's (1973:207) argument that defensive superiority increases the costs of conquest and consequently reduces the number of conquests, though those that do occur take longer. The strong implication is that defensive superiority reduces the likelihood of war.

Jervis provides the most systematic effort to trace the theoretical impact of the offensive/defensive balance on the likelihood of war. Using the conceptual device of the security dilemma, Jervis (1978:188-190) identifies a number of related linkages between offensive superiority and war. Most importantly, offensive superiority increases the benefits from striking first and increases the costs of allowing the adversary to strike first. This increases in turn the incentives to strike first and therefore the likelihood of war. Defensive superiority reduces both the benefits to the attacker who initiates a war and the costs to the defender who waits and absorbs the first blow, leaves neither side with an incentive to strike first, and thus reduces the likelihood of war (Quester, 1977:211). The likelihood of war is also increased by the erroneous perception of offensive advantage.

Second, offensive superiority contributes to arms races, which are themselves assumed to lead to war. The expectation that war will be frequent and short places a premium on high levels of existing armaments and on a quick response to an adversary's increases in armaments. When the defense is superior, however, inferior forces are sufficient for deterrence. Defensively superior weapons may further provide a dampening effect on the arms race because in such a situation security does not require the matching of the adversary arm for arm. Third, Jervis argues that offensive superiority increases the incentive to seek alliances in advance (Osgood, 1967:81), which contributes to polarization, tensions, and an increased probability of war.¹ It can also be argued that all of the destabilizing dimensions of the spiral model, including the psychological dynamics that reinforce them (Jervis, 1978:67-66), work to the fullest extent when the offense is superior.

There are numerous historical examples which are said to illustrate the destabilizing consequences of offensive superiority.² Perhaps the most widely cited is World War I. The perceived advantages of the offense (Hart, 1932:72; Farrar, 1973; Quester, 1977:103; Jervis, 1978:190-191) created enormous pressures for early mobilizations, which were widely believed to make war inevitable (Fay, 1928:II, ch. X; Levy, 1983b). Israel's preemptive strike against Egypt in 1967 may have been encouraged by the perceived advantages of the offense. The stability of the nuclear balance is widely believed to derive from the absence of incentives to strike first, incentives which are reduced by the existence of invulnerable retaliatory capabilities and countervalue potential.

While many of the hypotheses regarding the consequences of the offensive/defensive balance are inherently plausible, there are critical analytical problems which must be resolved before they can be accepted as meaningful or valid. These problems have to do with the theoretical logic of the hypotheses, the definition of the offensive/defensive balance, and the empirical validity of the hypotheses.

The hypothesis that the likelihood of war is increased when the military technology favors the offense is theoretically plausible only on the basis of the rather strong

assumption that decisionmakers correctly perceive the offensive/defensive balance. However, it is perceptions of one's psychological environment that determine decisions, not the 'objective' operational environment (Sprout and Sprout, 1965). The assumption of accurate perceptions is therefore open to question. The inherent difficulty of determining the offensive/defensive balance and the alleged tendency of the military to prepare for the last war rather than the next one may result in some profound misperceptions. It is widely agreed, for example, that in 1914 military technology favored the defense (Hart, 1932: 75; Fuller, 1961: ch. 8–9; Montgomery, 1983: 472) but that most decisionmakers perceived that it favored the offense. It was not the offensive/defensive balance that intensified worst-case analysis and increased the incentives for preemption, but decisionmakers' perceptions of that balance. If the offensive/defensive balance is not defined in terms of the perceptions of decisionmakers (and in most conceptualizations it is not so defined), then the hypothesis is technically misspecified. Hypothesis regarding the consequences of war, on the other hand, are properly defined in terms of the 'objective' balance.

The second problem relates to the definition of the offensive/defensive balance. What does it mean to say that the offense is superior to the defense, or *vice versa*? This will be treated at length in the following section, but one point should be made here. An hypothesis regarding the offensive/defensive balance has no explanatory power unless that concept can be nominally and operationally defined independently of its hypothesized effects. For example, Wright (1965: 796–97) states that

... it is difficult to judge the relative power of the offensive and defensive except by a historical audit to determine whether on the whole, in a given state of military technology, military violence had or had not proved a useful instrument of political change. ... During periods when dissatisfied powers have, on the whole, gained their aims by a resort to arms, it may be assumed, on the level of grand strategy, that the power of the offensive has been greater. During the periods when they have not been able to do so, it may be assumed that the power of the grand strategic defensive has been greater.

It would be tautological to use this conception of the offensive/defensive balance to predict to the military success of the aggressor, though it would be legitimate to predict to the frequency of war. Similarly, it is meaningless to hypothesize that offensive superiority increases the incentive to strike first if the offensive/defensive balance is defined by the incentive to strike first. The separation of hypothesis construction from concept definition and the absence of rigorous definition has increased the dangers of tautological propositions.

The failure to subject these hypotheses to systematic empirical testing is another major problem. Most attempts to identify the offensive/defensive advantage in various historical eras are not guided by an explicit definition of the concept,³ and rarely is there a demonstration that a given balance had an effect on the frequency of wars occurring or on the decisions for a particular war. The apparent *a priori* plausibility of a particular hypothesis may derive more from its tautological construction than from its correspondence with reality. In the absence of a more thorough analytic treatment and a more systematic empirical analysis the validity of any of these hypotheses cannot be accepted.

Definitions of the Offensive/Defensive Balance

Use of the concept of offensive/defensive balance to refer to a variety of different things has led to a great deal of confusion. Theoretical propositions which are meaningful or

interesting for one use of the term may not be very meaningful for another, and for this reason the various usages of the concept must be identified and examined.

Concern here is with the offensive/defensive distinction with respect to military technology and perhaps tactics⁴ but not with respect to policy. The question of whether national policy is offensive (aggressive) or defensive is not unimportant, but is analytically distinct and not directly relevant to the hypotheses surveyed earlier. These propositions all suggest that there is something about military technology itself that affects the likelihood or nature of war, and that what is important is whether technology gives an advantage to the offense or defense. This relative advantage may be one of several variables affecting the likelihood of war by affecting policy, but itself is analytically distinct from policy.

The offensive/defensive balance of military technology has been defined primarily in terms of the ease of territorial conquest, the characteristics of armaments, the resources needed by the offense in order to overcome the defense, and the incentive to strike first.

Territorial Conquest

The most common use of the concept of the offensive/defensive balance is based on territorial conquest and the defeat of enemy forces. Quester (1977:15) states that 'the territorial fixation then logically establishes our distinction between offense and defense.' Jervis (1978:187) argues that an offensive advantage means that 'it is easier to destroy the other's army and take its territory than it is to defend one's own.' 'The essence of defense,' on the other hand, 'is keeping the other side out of your territory. A purely defensive weapon is one that can do this without being able to penetrate the enemy's land' (1978:203). A defensive advantage means that 'it is easier to protect and hold than it is to move forward, destroy, and take' (Jervis, 1978:187). Wright (1965:793) includes these notions of defeat of enemy forces and territorial seizure in his rather complex definition:

On a tactical level the offensive or defensive quality of a unit may be estimated by considering its utility in an attack upon an enemy unit like itself or in an attack upon some other concrete enemy objective, such as territory, commerce, or morale.⁵

A primary purpose of protecting territory, of course, is the protection of people and property. What is perhaps implicit in the above definitions is made explicit by Tarr (1983): 'Defense refers to techniques and actions, both active and passive, to repel attack, to protect people and property, to hold territory, and to minimize damage by the attacker.' This linkage of territorial conquest to population defense creates a problem, however. While territorial defense was sufficient for the protection of people and property in the pre-nuclear era (or at least in the era before strategic bombardment), that is no longer true. As Schelling (1966: ch. 1) and others have noted, the uniqueness of the nuclear age lies in the fact that the defeat of the adversary's military forces and territorial penetration are no longer necessary for the destruction of his population centers. The destruction of population and the coercive power that it makes possible are no longer contingent upon military victory. For this reason the protection of territory (from invasion) is analytically distinct from the protection of population. The inclusion of both in a definition of the offensive/defensive distinction only creates confusion (unless the use of that concept is explicitly restricted to the pre-nuclear era), for the hypothesized effects of an 'offensive' advantage are precisely the opposite for the two concepts. The likelihood of war presumably increases as territorial conquest becomes easier, because the probability of victory increases while its expected costs decrease. But the ability to

destroy enemy population and industrial centers contributes to deterrence in the nuclear age, and therefore it decreases the likelihood of war (or at least nuclear war).

It is because of the distinction between deterrence and defense (Snyder, 1961: 14–16) that the meaning of the offensive/defensive balance may differ in the nuclear and pre-nuclear eras. Whereas in the pre-nuclear era both deterrence and defense were based on the capacity to defeat the armed forces of the enemy, that is only true for defense in the nuclear age, for deterrence is ultimately based on countervalue punishment. The use of military force for the purpose of defeating enemy armed forces is analytically distinct from the use of force for coercion (Schelling, 1966: ch. 2). Consequently, traditional hypotheses (Wright and others) regarding the effects of the offensive/defensive balance of military technology are not necessarily applicable for nuclear powers at the strategic level. Neither the concepts nor the hypotheses are interchangeable.⁶

Now let us return to the territorial conception of the offensive/defensive balance. Our earlier discussion leads to the question of what, besides the numbers of troops or weapons, contributes to the defeat of enemy forces and conquest of territory. One answer is provided at the tactical level, based on movement towards the armed forces, possessions, or territory of the enemy. A condition of relative passivity and immobility in waiting for the enemy to attack defines the strategic and tactical defensive (Wright, 1965: 807). Clausewitz (as quoted in Boggs, 1941: 68) states:

What is defense in conception? The warding off a blow. What is then its characteristic sign? The state of expectancy (or of waiting for this blow). . . by this sign alone can the defensive be distinguished from the offensive in war. . . .

Clausewitz also writes: ‘In tactics every combat, great or small, is defensive if we leave the initiative to the enemy, and wait for his appearance on our front’ (as quoted in Boggs, 1941: 68).

Both offensive and defensive modes of war on the tactical level are necessary, of course, for the achievement of either offensive or defensive objectives. The pursuit of any offensive goal requires a supporting defense, and the defense alone can never bring victory but only stalemate. Mahan refers to ‘the fundamental principle of naval war, that defense is insured only by offence’ (Boggs, 1941: 70). Clausewitz writes that an absolute defense is an ‘absurdity’ which ‘completely contradicts the idea of war’ (Boggs, 1941: 71). At some point it is necessary to seize the tactical offensive in order to avoid defeat.⁷ Thus the familiar maxim: the best defense is a good offense. It is necessary, however, to distinguish between the strategic and tactical levels. A general fighting offensively in strategic terms needs only to invade and then hold territory to enable him to adopt the tactical defensive (Strachan, 1983). It may be strategically advantageous to maneuver the enemy into a position in which he is forced to take the tactical offensive under unfavorable conditions. As the elder Moltke stated in 1865, ‘our strategy must be offensive, our tactics defensive’ (Dupuy, 1980: 200). In addition, military tactics may be offensive in one theater and defensive in another. The Schlieffen Plan, for example, required a holding action against Russia in the east in order to move against France in the west. Nevertheless, with certain types of weapons systems more movement and tactical mobility is possible than with others. It is difficult to measure movement historically while controlling for non-technological factors,⁸ however. This leads us to the question of whether the offensive/defensive balance can be defined by the characteristics of weapons systems themselves.

The Characteristics of Armaments

While nearly all weapons can be used for either the strategic or tactical offensive or the strategic or tactical defensive, the question is whether there are some weapons systems which contribute disproportionately more to one than to the other. As stated by the Naval Commission of the League of Nations Conference for the Reduction and Limitation of Armaments (1932–1936) (Boggs, 1941:82).

Supposing one state either a) adopts a policy of armed aggression or b) undertakes offensive operations against another state, what are the weapons which, by reason of their specific character, and without prejudice to their defensive purposes, are most likely to enable that policy or those operations to be brought rapidly to a successful conclusion?

Hart (1932:73) argues that certain weapons 'alone make it possible under modern conditions to make a decisive offensive against a neighboring country.' What are the characteristics of such weapons?

Both Fuller and Hart identify mobility, striking power, and protection as the essential characteristics of an offensive weapon (Wright, 1965:808). Striking power (the impact of the blow) is not alone sufficient. A mobile gun contributes more to the tactical offensive than an immobile one, and its penetrating power is further enhanced if it is protected. But protection is even more important for the defense. Mobility and protection are inversely related, for it is easier to protect immobile weapons and wait passively for the enemy to attack. The offensive value of the medieval knight ultimately was negated by the heavy armor which protected him but restricted his mobility. Thus Dupuy and Eliot (1937:103) give particular emphasis to the offensive advantages of mobility and striking power, noting that they too may be in conflict. Boggs (1941:84–85) argues that 'the defense disposes especially of striking power and protection, to a lesser degree of mobility, while the offense possesses mobility and striking power, and protection to a lesser degree.' He concludes that mobility is the central characteristic of an offensive weapon and argues that 'armament which greatly facilitates the forward movement of the attacker might be said tentatively to possess relatively greater offensive power than weapons which contribute primarily to the stability of the defender' (Boggs, 1941:85). Our later survey of attempts by military historians to identify the offensive/defensive balance in various historical eras will show that tactical mobility is the primary criterion used to identify an advantage to the offense.

In terms of the characteristics of armaments, then, tactical mobility and movement toward enemy forces and territory are the primary determinants of the offense, at least in land warfare; protection and holding power contribute more to the defense. Other weapon characteristics such as striking power, rapidity of fire, and the range of a weapons system do not contribute disproportionately to either the offense or the defense.⁹ Much more work needs to be done here, however, because of the lack of precision of some of these concepts.

The classification of weapons systems by their contribution to mobility and tactical movement toward enemy forces and territory is much less useful for naval warfare. This was evident from the proceedings of the League of Nations Conference for the Reduction and Limitation of Armaments, where the problems and disagreements confronting the Naval Commission were even more serious than those confronting the Land Commission and where technical arguments were even more likely to follow the flag (Boggs, 1941:50–60). The United States, among others, declared that the qualitative distinction

could not be applied to navies. Hart, a proponent of the qualitative principle in general, restricted it to the materials of land warfare (Boggs, 1941:50, 81). The main problem with attempts to apply these principles of mobility and tactical movement to naval warfare is the absence of anything comparable to the territorial standard occurring in land warfare. The command of the seas, the ultimate objective of naval warfare (Mahan, 1957), can be served by passive as well as aggressive action, for the neutralization of the enemy fleet by a blockade may serve the same function as its defeat. Moreover, aggressive action toward the enemy fleet does not always result in battle, for an inferior navy can often avoid battle without sacrificing major territorial objectives, unlike land warfare.

Application of the territorially-based criterion of tactical mobility to aerial weapons systems raises the question of whether the offensive or defensive character of these weapons is determined independently of land warfare or by their contribution to the defeat of enemy ground forces and territorial conquest. Many aerial weapons systems do contribute to the tactical offensive on the ground because of their striking power, mobility, and surprise (for example, in the Nazi *blitzkrieg*). Yet air power also has an independent capability to destroy the enemy's war making industrial capabilities, and hence contributes to deterrence in the nuclear age. This deterrent effect of air power takes place independently of its effect on the tactical offensive on the ground but cannot easily be incorporated into a conception of the offensive/defensive balance based on tactical mobility.

Some armaments that traditionally have been considered as defensive and therefore assumed to be 'stabilizing' (in the sense that they discourage aggression and reduce the likelihood of war) are often considered to be destabilizing in the nuclear age. Air defenses, anti-ballistic missile defenses, and even civil defenses are considered under the prevailing strategic doctrine to be destabilizing because by protecting populations they threaten to undermine deterrence. This reinforces our earlier point that the hypothesized consequences of a military technology favoring the offense (or the defense) may not be interchangeable between the nuclear and pre-nuclear eras.

The definition of the offensive/defensive balance, in terms of the characteristics of armaments, raises other questions as well. One is whether it is possible to define the offensive/defensive character of a weapon by its intrinsic performance characteristics alone, apart from the prevailing doctrine that determines its use. For example, essentially the same tank that was used in much of World War I as protected fire support was used in World War II as the organizing element of mobile offensive warfare (Fuller, 1945:ch. VI). The offensive character of Napoleonic warfare was due far more to the innovative tactics of Napoleon than to weapons systems themselves (Howard, 1976:75-76; Preston and Wise, 1979:189-191).¹⁰ It must be concluded that the offensive or defensive character of a weapons system must be defined by both its intrinsic characteristics and the tactical doctrine which determines its use.

What is important, of course, is not the characteristics of an individual weapon, but rather the aggregate impact of all weapons systems in a given arsenal. How is a given mixture of armaments, designed for different purposes and deployed for use in different theaters on land, sea, and air, to be aggregated so that their net effect on the offense and defense can be classified? This overall impact cannot be determined apart from the composition of an enemy's weapons systems and the terrain where the combat takes place. The offensive value of the tank, for example, was reduced by the development of new anti-tank technologies in the early 1970s. To complicate matters further, most hypotheses relating to the offensive/defensive balance treat that concept as a

systemic-level attribute (the hypotheses that offensive superiority contributes to an increased frequency of war and to empire-building, for example). They suggest that at a given time the offensive/defensive balance can be characterized by a single value throughout the system. The balance must be aggregated not only over all weapons, functional roles, and theaters for a given state, but also over all states in the system. This is difficult given differential levels of industrialization and military power, uneven rates of technological diffusion, and doctrinal differences among various states in the system.¹¹ Some of these problems are minimized, however, if the focus is restricted to the leading powers in the system, because they are often comparable in terms of power and technology.

Relative Resources Expended

Gilpin distinguishes between the offense and the defense in terms of an economic cost-benefit framework. 'To speak of a shift in favor of the offense means that fewer resources than before must be expended on the offense in order to overcome the defense' (Gilpin, 1981:62-63). Gilpin goes on to say that 'the defense is said to be superior if the resources required to capture territory are greater than the value of the territory itself; the offense is superior if the cost of conquest is less than the value of the territory' (p. 63).

Clearly the second definition does not follow from the first. Whereas the first uses the relative costs of overcoming the defense at two different times and independently of the resulting benefits, the second definition introduces an entirely new concept—the actual value of the territorial conquest itself. The value of territorial conquest is undoubtedly an important variable leading to war but it is analytically distinct from military technology and ought to be treated separately. Under Gilpin's second definition the hypothesis becomes equivalent to the statement that a positive (expected) utility of territorial conquest increases the likelihood of war. This may be true (Bueno de Mesquita, 1981), but it is not the hypothesis under consideration here. Moreover, the definition of the offensive/defensive balance by the utility of territorial conquest reduces to a tautology the hypothesis that offensive superiority increases the utility of territorial conquest.

One of the two conceptualizations of the offensive/defensive balance suggested by Jervis is more consistent with Gilpin's first formulation. Jervis (1978:188) poses the question as follows: 'Does the state have to spend more or less than one dollar on defensive forces to offset each dollar spent by the other side on forces that could be used to attack?' That is, what is the relative marginal utility of devoting military spending to the offense rather than to the defense? This approach is potentially valuable, but it is incomplete. It defines what it means to say that the offense (or the defense) has an advantage, but fails to provide any criteria for specifying what constitutes the offense or the defense in the first place. The marginal utilities cannot be compared until the offense and defense are first defined, and until this is done the concept is not particularly useful.

The definition of the offensive/defensive balance by the relative resources that must be expended on the offense in order to overcome the defense can be conceptualized in another way and related to the conception based on territorial conquest. This refers to attack/defense ratios rather than military spending. What ratio of troops does an attacker need in order to overcome an enemy defending fixed positions? This notion is mentioned but not developed by Quester (1977:212): 'The significant impact of defensive or offensive technology shows up in the minimum ratios of numerical superiority required for such an offensive.' It follows the same logic as Foch's comment regarding the power of the offensive prior to World War I: 'Formerly many guns were necessary to produce an effect. Today a few suffice' (Montross, 1960:686). The

conventional wisdom is that the offense needs at least a three-to-one advantage, but the point here is that this ratio varies as a function of existing military technology and the tactical doctrine guiding its use. The offensive/defensive balance is then defined as being inversely proportional to the minimum ratio of forces needed by the attacker in order to overcome an adversary defending fixed positions.¹² The greater the minimum ratio, the greater the advantage of the defense.

It is important to note here that the minimum *ratio* of forces needed by the attacker in a particular era is analytically distinct from the relative *numbers* of forces actually possessed by two adversaries in a particular situation. The probability of victory is a function of both. To say that the balance of military technology (as a function of attack/defense ratios) favors the offense does *not* mean the attacker is likely to win. That would be true only if the attacker actually possessed the requisite number of troops in a particular situation.

The problem arises as to what ratio should be used as a baseline, the zero-point indicating the transition from a defensive advantage to an offensive advantage. The most obvious ratio is one to one, but that is widely regarded as favoring the defense.¹³ While it would not be technically incorrect to say that the balance always favors the defense because the attacker always requires numerical superiority, this is neither interesting nor useful. If the offensive/defensive balance is defined as attack/defense ratios, it is preferable to conceive of this in relative rather than absolute terms. It is useful to speak of shifts in the balance and to compare the balance at different times, but not to speak about the absolute state of the balance. Thus the hypothesis should technically state that 'the higher the minimum ratio of forces needed by the attacker in order to overcome an adversary defending fixed positions, the lower the likelihood of war.'

This conception of the offensive/defensive balance is more useful than the others surveyed above, at least for land warfare. The attack/defense ratio could be measured in one of two ways. It could be determined empirically from an analysis of a variety of battles in a given era, with the force ratios and results determined for each and some kind of average computed. The problem, of course, would be the need to control for asymmetries in geography, troop quality, and doctrine. Alternatively, the ratio could be conceived in perceptual terms and measured by the perceptions of military and political elites of what ratio of forces is necessary for either attack or defense. While this information is not readily available it might be inferred from an examination of the war plans of the leading states. The methodological problems involved in either of these approaches are quite serious, however.

The Incentive to Strike First

One of the questions asked by Jervis (1978: 188) of the offensive/defensive balance is the following: 'With a given inventory of forces, it is better to attack or to defend? Is there an incentive to strike first or to absorb the other's blow?' This conceptualization is more flexible than earlier criteria based on tactical mobility and characteristics of armaments because it can incorporate considerations of deterrence and be applied to the nuclear age. It creates some problems, however, which Jervis may recognize but does not fully develop. For one thing, the hypothesis that a military technology favoring the offense increases the incentive to strike first is reduced to a tautology and hence carries no explanatory power. In focusing attention on the linkage between the incentive to strike first and war,¹⁴ it ignores the more basic question of what conditions create an incentive to strike first. These antecedent conditions possess the greatest explanatory power and operate through the intervening variable of the incentive to strike first. This leads to a

related problem: there are numerous factors besides technology and doctrine affecting the incentive to strike first, including geographic constraints and diplomatic and domestic political considerations, factors which also have an independent effect on war. If the offensive/defensive balance is *defined* as the incentive to strike first, then it becomes confounded with these other variables and it becomes impossible to distinguish their independent effects. The incentive to strike first is best conceptualized as an intervening variable leading to war and as the product of several distinct variables, one of which is military technology and doctrine. One key issue is to elaborate the aspects of military technology or doctrine which affect the incentives to strike first, but this cannot be fully analyzed here.

It is important to distinguish the incentive to strike first from other concepts that have also been used to define the offensive/defensive balance. The incentive to strike first should not be confused with aggressive policy, which is influenced by a wide range of variables. A state may have revisionist ambitions but be constrained by a military technology favoring the tactical defense, as well as by other variables. Or, a state with purely defensive ambitions may rationally initiate war if it perceives that through a preemptive strike it can minimize its losses against an assumed aggressor. The distinction between the incentive to strike first and seizing territory is particularly likely to be confused.¹⁵ These are clearly distinct for naval and air warfare (particularly in the nuclear age) but the difference is more profound. One may simultaneously have a policy of not striking first *and* a strategy of active defense and territorial penetration in the event that war does break out. This was Bismarck's policy in the 1870s and 1880s (Langer, 1964) and perhaps Israel's in 1973. Germany's Schlieffen Plan called for passive defense (holding ground) in the East and rapid territorial penetration in northern France regardless of who initiated the war.

The failure to recognize these distinctions only creates confusion and may result in the incorrect use of hypotheses designed for other purposes. Hypotheses appropriate for a territorially-based definition of the offensive/defensive balance of military technology may not be valid for a definition based on the incentive to strike first. While the ease of territorial seizure may shorten wars and lower their costs (Wright, 1965:673), this may not necessarily be true for the incentive to strike first. Nor is an incentive to strike first in the nuclear age likely to have the same consequences as an attack/defense ratio which favors the offense. Further, it is not clear that the incentive to strike first itself has the same causes or consequences in the pre-nuclear period as it does in the nuclear age, though this might be an interesting area for future research.

The same types of problems arise with respect to the various other conceptualizations of the offensive/defensive balance examined above. The concept has been defined in terms of the defeat of enemy armed forces, territorial conquest, protection of population, tactical mobility, the characteristics of armaments, attack/defense ratios, the relative resources expended on the offense and the defense, and the incentive to strike first. These separate definitions are often not interchangeable, and hypotheses based on one definition are often either implausible or tautological for another definition. This is particularly true for applications of the offensive/defensive balance to the nuclear age. Because the most advanced weapons of this era are used primarily for coercive purposes and the weapons of earlier eras were used primarily to engage enemy armed forces, the concept of the offensive/defensive balance of military technology may mean entirely different things in the two different situations. Certainly one reason for the confusion and ambiguity among these hypotheses is the fact that they are based on common concepts such as 'offense', 'aggressor', and 'initiator' which have ordinary language

meanings apart from more precise technical meanings. This is all the more reason why any attempt to use such a concept must first define it explicitly and be very clear regarding precisely which hypotheses are relevant.

Classification of the Offensive/Defensive Balance in History

The third section of this article surveys a variety of efforts to classify the offensive/defensive balance of military technology in the Western international system over the last eight centuries.¹⁶ This survey will be useful because of the absence of any previous review of this body of literature and because of the general failure of earlier studies to acknowledge or build upon each other. More importantly, it may reveal whether or not the concept has acquired an informal definition in its empirical application, in spite of the conceptual ambiguity demonstrated above. While the concept of the offensive/defensive balance of military technology has taken on a variety of meanings, the question arises as to how that concept has been used in attempts to classify the offensive/defensive balance in past historical eras. If different authorities have generally used the offensive/defensive balance to mean the same thing (even in the absence of any formal nominal or operational definition), and if they have generally agreed on the state of the balance in various historical eras, then it can be concluded that the ambiguity of the concept has not precluded its effective use in empirical analysis. Consistent usage and agreement by various authorities on the state of the balance in different historical eras would permit 'intercoder agreement' to be used as the basis for accurate historical measurement (provided these measurements are independent).¹⁷ Lack of agreement on classification, however, would suggest that the collective judgment of authorities cannot be used as the basis for measurement. It would also support the earlier conclusion that the offensive/defensive concept needs to be defined much more explicitly and rigorously before it can be used in historical analysis.

There is little dissent from the view that the late Middle Ages was characterized by the ascendancy of the defense over the offense in war. The Crusades had stimulated a revival in military architecture, and advances in the art of fortification outpaced increases in destructive power and improvements in siege tactics (Fuller, 1945:68; Montross, 1960:161-163; Ropp, 1962:20; Nef, 1963:185; Wright, 1965:795, 1525; Osgood, 1967:43; Brodie and Brodie, 1973:31; Bean, 1973:207; Preston and Wise, 1979:68-69, 78, 81; Gilpin, 1981:62; Montgomery, 1983:166-171). As a result, only a small percentage of sieges were successful (Montgomery, 1983:169). The defensive power of the new concentric stone castles was reinforced by logistical considerations. Armies could not be maintained in the field for long periods and invading armies could not easily bypass the feudal castles (Bean, 1973:218). In addition, the replacement of chain mail by plate armor to protect the knight greatly reduced his mobility (Montross, 1960:163; Preston and Wise, 1979:85) and the pike-phalanx system was becoming increasingly invulnerable to cavalry charge (Bean, 1973:206). It has also been argued that the success of the English with the longbow increased the tactical superiority of the defense (Dupuy, 1980:88), presumably because its range made it more difficult for the offense to close. For these reasons, all of the above authorities accept Oman's (1953:356) argument that 'by 1300 the defensive obtained an almost complete mastery over the offensive.'¹⁸

By the mid-15th century fire power had moved from an auxiliary role to one where it was central and decisive (Howard, 1976:33). Developments in heavy artillery led to a sharp resurgence of offensive superiority. This was symbolized by the siege of

Constantinople in 1453, where the greatest of all medieval fortifications was reduced by the Turks in less than two months. Dupuy (1980:107) argues that by the end of the 15th century artillery had made medieval fortifications obsolete. In addition, greater mobility, and hence greater offensive capability, of this artillery is evidenced by the use of horse-drawn artillery and chains of 'wagon forts' as mobile fortifications employing bombards (Montross, 1960:189; Brodie, 1973:51; Quester, 1977:47-48; Dupuy, 1980:100). Small firearms also began to have a significant effect on battle at the end of the 15th century, dominating over the pike and leaving the armored knight vulnerable and lessening his local defensive effectiveness (Nef, 1963:29; Quester, 1977:48-49). Thus a drastic change in the offensive/defensive balance is said to occur close to 1450 (Fuller, 1945:81-87; Montross, 1960:193-95; Nef, 1963:185-186; Wright, 1965:294; Bean, 1973:207; Quester, 1977:47-49; Preston and Wise, 1979:91-92; Dupuy, 1980:99, 106-107; McNeill, 1982:83; Montgomery, 1983:224).

There is much debate regarding how long this period of offensive superiority lasted. Wright (1965:294-295, 795) argues that it lasted for two centuries until 1648, a view supported by Nef (1963:185) and Quester (1977:49). Wright (1965:294-95) points to the increase in mobility of infantry generated by the gradual abandonment of medieval armor; the disappearance of pikemen, halberdiers, and heavy cavalry; and the adoption throughout Europe of Turkish Janissary tactics, with armies equipped with cutlass and longbow and supported by light cavalry and artillery. Mobility was further increased in the first half of the 17th century after Gustavus Adolphus reduced the weight of weapons, introduced the light field gun and the concept of mobile massed artillery fire, and adopted a more flexible tactical organization (Dupuy, 1980:137-38; McNeill, 1982:123).

These arguments are rejected by other authorities who instead argue that the science of fortification soon overcame the new developments in artillery, leading to a shift back to the defense by 1525 or so (Hale, 1957:274; Montross, 1960:211, 250-54; Bean, 1973:208; Howard, 1976:35; Preston and Wise, 1979:106; McNeill, 1982:90; Montgomery, 1983:224). Dupuy and Dupuy (1977:455) argues: 'A 16th-century fortress, if provided with adequate stocks of food and ammunition, was as impregnable as the 13th-century castle had been in its day.' Thus there is no consensus as to whether the balance of military technology throughout most of the 16th century and the first half of the 17th century favored the offense or the defense.

Authorities generally agree that for nearly a century after 1650 the balance of military technology lay with the defense.¹⁹ This was largely due to the development of a new science of fortifications by Vauban and other military engineers in the late 17th century (Guerlac, 1969). These elaborate fortifications became increasingly invulnerable to artillery, and frontal assault became nearly impossible. This was the age of geometric warfare, of position and maneuver rather than pitched battle. Military operations were centered around fixed fortifications and were restricted by poor logistical systems and short supply lines, and guns were deficient in range, accuracy, and penetrating power (Preston and Wise, 1979:142-44; Dupuy, 1980:144). Vauban also developed the science of siegecraft with his system of approaches by parallels, but such systems generally remained one step behind systems of fortifications.

The balance did not turn against the defense until 1789 (Nef, 1963:185; Wright, 1965:295; Osgood, 1967:46; Howard, 1976:55; Quester, 1977:57; Preston and Wise, 1979:142-143). This view is inconsistent, however, with the general characterization of the warfare of Frederick the Great as offensive in nature, based on Frederick's emphasis on the decisiveness of the battle rather than static maneuver, his willingness to take risks,

his use of the oblique order as a tactical device, and his emphasis on mobility (Dupuy, 1980: 148–154). Preston and Wise (1979: 147–149) recognize this and say simply that Frederick differed from the norm of 18th-century warfare. The hesitancy to characterize the military balance during this period as offensive probably derives from the fact that Frederick's innovations were primarily tactical and strategic rather than technological, and because most historians describing the military balance focus on the latter rather than the former. Still, it cannot be denied that Frederick demonstrated what was possible given the technology of the time. The recognition by many that Frederick constitutes an exception to the static character of 18th-century warfare suggests that the characterization of the entire 18th-century military balance as defensive is open to question.

The Napoleonic period presented a similar set of problems; Napoleonic warfare was characterized by mobility and the tactical offensive but this had little to do with military technology itself (Howard, 1976: 76). Preston and Wise (1979: 189) argue that in some respects Napoleon was an 'arch-reactionary toward new weapons and technological progress in the material of war' and that his successes came through a 'more efficient use of well-known weapons.' The offensive character of Napoleonic warfare derived from the generalship of Napoleon and his changes in military organization, strategy, and tactics, including the democratization of war and mass mobilization. The divisional formation, the employment of light infantry, the use of the column of attack instead of the line, a more flexible use of artillery on the battlefield to gain a superiority of fire at a given point, and the logistical advantages of living off the country were particularly important in contributing to mobility (Fuller, 1961; ch. 3; Hart, 1964: ch. 8; Ropp, 1962: 98–102; Howard, 1976; Quester, 1977: ch. 7; Preston and Wise, 1979: ch. 12; Strachan, 1983: ch. 4). These authorities often refer to the offensive character of Napoleonic warfare but do not trace it to the balance of military technology itself.

Few judgments are made regarding the offensive/defensive balance for the first half of the 19th century, perhaps because of the relative absence of European war during that period. By mid-century, or by 1870 at the latest, the balance had shifted in favor of the defense, which continued through World War I. Reference is made to the holding power of entrenchments, barbed wire, the machine gun, the breech-loading rifle, the difficulty of frontal assault and closing with the enemy, and to the generally static nature of warfare as demonstrated in the American Civil War, the Russo-Turkish and Russo-Japanese Wars, and others. As summarized by Boggs (1941: 76–77), beginning with the American Civil War and extending through World War I there was a trend 'toward enormous increase in the masses of men under arms, and in the range, casualty-producing capacity, and rapidity of fire of infantry weapons, without any counteracting growth in the means of advancing of this fire.' This conclusion, including the view that the 'objective' balance favored the defense in 1914, is supported by Hart (1932: 72, 75), Millis (1956: 167), Montross (1960: 633, 649), Fuller (1961: chs. 8–9), Ropp (1962: 162), Wright (1965: 1525), Brodie and Brodie (1973: 131–56), Howard (1976: 103, 105), Preston and Wise (1979: 266), Dupuy (1980: 195, 199), Gilpin (1981: 62), and Montgomery (1983: 441, 458, 472).

Some of these authorities concede, however, that the railroad and the development of motorized transport and then the tank all contributed to mobility and helped the offense, as demonstrated by the wars of Bismarck (Wright, 1949: 186, Brodie and Brodie, 1973: 148–50). Quester (1977: ch. 8) suggests that for this reason there was for a time a net advantage to the offense. Montross (1960: 649) rejects this view and argues that the offensive prevailed in 1870 because 'intelligent defensive tactics were seldom employed.'

A more serious problem is raised by the gap between the 'objective' balance of military technology (as judged retrospectively by historians) and the balance as perceived by the military and political leaders of the time. This gap widened shortly after the American Civil War, the defensive lessons of which were resisted by professional soldiers (Montross, 1960:633; Fuller, 1961:ch. VI; McNeill, 1982:242). By the turn of the century Foch and the French school (Possony and Mantoux, 1969) epitomized the viewpoint prevailing at the time that military technology favored the offense, and this belief structured the war plans and influenced the behavior of the great powers (Montross, 1960:685-88; Hart, 1973:72; Quester, 1977:80; Jervis, 1978:190-91; Dupuy, 1980:216; Montgomery, 1983:441; Strachan, 1983:105-6). The French Army Field Regulations of 1913 stated that 'the French Army. . .admits no law but the offensive' (Tuchman, 1962:151). Most authorities currently argue that the 'objective' balance favored the defense. Vyvyan (1968:165) argues: 'Never has the dogma of the offensive been more prevalent; never, because of the lead of firepower over tactical mobility, has that dogma been less applicable.' Because of this gap between perceptions and reality and because of the ambiguity regarding the role of perceptions in definitions of the offensive/defensive balance, the period prior to World War I becomes difficult to classify in terms of the offensive/defensive balance.

The interwar period presents a similar gap between the analysis of military historians and the perceptions of statesmen. Most military historians argue that by 1930 or so the military technology favored the offense (Hart, 1932:76; Millis, 1956:252-53; Montross, 1960:774; Fuller, 1961:ch. 12; Wright, 1965:300-301; Gilpin, 1981:62).²⁰ The speed, mobility, and striking power of the armored division with tactical air support had a great advantage over field defenses and minor fortifications. The new warfare was characterized by fluidity and speed, deep penetrations, and broad encirclements. The stalemate of World War I had been transformed into the *blitzkrieg* of World War II. Most observers at the time, however, perceived that the military technology favored the defense (Montross, 1960:766-67; Wright, 1965:795; Gibson, 1969; Alexandroff and Rosecrance, 1977; Quester, 1977:ch. 11; Jervis, 1978:192-93). This view was disputed by the leading proponents of armored warfare (Fuller, de Gaulle, Guderian, and Tukhachevski) but their view was of the minority.²¹ Thus the balance of military technology in the interwar period becomes difficult to classify.

It is seen that military historians and others have evaluated the offensive/defensive balance of the last eight centuries of the Western international system in terms of the contribution of weapons systems to tactical mobility and territorial penetration. This is in spite of their lack of formal definition of the concept and the variety of theoretical perspectives surveyed earlier. This implicit agreement on the appropriate criterion no longer exists, given the decline in the dominance of land warfare and the rise of deterrence based on nuclear punishment. Because of the lack of consensus on the meaning of the offensive/defensive balance in the nuclear age, it would not be useful to survey attempts to classify the balance during this period. Let us now summarize the extent of 'intercoder agreement' regarding the offensive/defensive balance of military technology for the previous eight centuries.

There is unanimous agreement among the references cited that the period from 1200 to 1450 was characterized by defensive superiority and that the period from 1450 to 1525 was characterized by offensive superiority. The authorities are split on the 1525 to 1650 period. There is complete agreement that the defense was superior from 1650 to 1740. Some argue that this defensive superiority continues until 1789, though Frederick's emphasis on the tactical offensive leads some to assert the opposite and others to make no

specific evaluation. The 1789 to 1815 period is generally regarded to favor the offense but because of innovations in tactics rather than armaments. Little attention is given to the 1815–1850 period. The next hundred years pose a problem because of the gap between the objective and perceived balance and the uncertain conceptual status of the latter. These authorities generally agree that from 1850 to 1925 or so the balance favored the defense but that nearly all statesmen perceived that it favored the offense from 1870 to 1914. Similarly, from 1930 to 1945 the balance favored the offense but that the actors themselves perceived that it favored the defense.

A rough calculation shows the following degree of consensus among our authorities. Of the 450 years from 1495–1945,²² only two periods totaling 55 years claim a definite consensus of offensive superiority. Two periods totaling at most 130 years claim a consensus of defensive superiority. Four periods constituting a minimum of 265 years are uncertain, either because of diverging views, or because of the diametric opposition of the evaluations of actors and analysts and the ambiguous conceptual status of perceptions in definitions of the balance.²³ The inescapable conclusion is that there exists considerable divergence of opinion among leading authorities regarding the offensive/defensive balance during the last five centuries of the modern era, and that a method of ‘intercoder agreement’ cannot be used to provide a basis for classification during this period. This analysis suggests that the concept of the offensive/defensive balance of military technology needs more theoretical attention and operational definition before it can be applied to systematic empirical analysis.

Conclusions

The concept of the offensive/defensive balance of military technology has been defined in the literature in terms of the defeat of enemy armed forces, the ease of territorial conquest, protection of population, tactical mobility, the characteristics of armaments, the relative resources expended on the offense and the defense, and the incentive to strike first. I have suggested an alternative definition based on attack/defense ratios: the offensive/defensive balance is inversely proportional to the ratio of troops needed by an attacker to overcome an enemy defending fixed positions.

While many of these individual concepts may be useful, they mean fundamentally different things and are not interchangeable. This is particularly true for the nuclear era, where the end of the predominance of land warfare and the emergence of deterrence based on nuclear punishment has clouded the offensive/defensive distinction. Since the dominant weapons in the pre-nuclear era were used primarily for the defeat of adversary armed forces, whereas the most advanced weapons in the nuclear era are used by the leading powers primarily for coercion and bargaining, definitions of the offensive/defensive balance that might be useful in the nuclear age may not be useful in the pre-nuclear era, and *vice-versa*. The concept of the incentive to strike first, which is often used to define an offensive advantage today, is not the same as tactical mobility, which is widely used to define an offensive advantage in earlier times.

The inclusion of fundamentally different concepts under the umbrella of the offensive/defensive balance has created considerable confusion in the literature. Because these different concepts are not interchangeable, theoretical propositions regarding the causes or consequences of an offensive or defensive advantage may be useful for one definition but implausible for another. Weapons characteristics that are stabilizing (*i.e.*, reduce the likelihood of war) in one era may be destabilizing in another. Hypotheses

designed to explain the consequences of a military technology favoring tactical mobility are not necessarily applicable to a military technology which creates an incentive to strike first.

The ambiguity of the concept of the offensive/defensive balance is not just a function of the nuclear/pre-nuclear distinction. Even concepts restricted to land warfare in the pre-nuclear era have different meanings and may have different theoretical consequences. Our survey of attempts by military historians and others to identify the offensive/defensive balance in various historical eras is relevant here. In spite of the common focus on land warfare, there is remarkably little consensus among these authorities regarding the state of the offensive/defensive balance in most periods. This suggests that far more conceptual clarification and rigorous operational definition are necessary before the offensive/defensive distinction can be useful in historical analysis.

To conclude, the concept of the offensive/defensive balance is too vague and encompassing to be useful in theoretical analysis.²⁴ Many of the individual variables that have been incorporated into the more general idea may themselves be useful, however. Few would doubt the utility for deterrence theory of the concept of the incentive to strike first, for example, and the concept of attack/defense ratios suggested here deserves further exploration. Much more conceptualization is necessary before these individual variables can be effectively used in empirical analysis, however. There is already a body of theory regarding the consequences of an incentive to strike first. What is needed are comparable theories regarding the consequences of military technologies which contribute to tactical mobility or to the ease of territorial conquest, or which reduce the ratio of forces needed by the attacker to overcome an adversary defending fixed positions. Interaction effects between these separate variables also need to be explored. Further theoretical development of this kind is necessary, because in its absence there is little reason to believe that these individual concepts have an important impact on war, and therefore little reason to use these concepts in empirical analysis.

Notes

1. The theoretical literature is divided on the question of whether alliances contribute to war or to peace. The empirical evidence is also mixed (Buono de Mesquita and Singer, 1973; Levy, 1981). Nor have the linkages between arms races and wars been thoroughly established (Wallace, 1979).
2. Here 'destabilizing' is used to mean an increase in the likelihood or frequency of war.
3. The most notable exception here is Quester (1977), though the connection between his nominal definitions and historical classifications is not always clear.
4. For this reason I am not concerned here with Boggs' (1941:63-72) distinction between the offensive and defensive on the 'grand strategic level', which he sees as based on a 'political' or Clausewitzian theory of war. Boggs suggests that on this level the offensive/defensive distinction is based on the political objectives toward which military operations are conducted, and that the concept is generally defined this way by military theorists: 'The difference between offensive and defensive is a difference in objectives, not a difference in the means employed to reach the objective.' (Boggs, 1941:72). This conceptualization not only involves the analytical problem of distinguishing in principle between 'offensive' and 'defensive' policies (which vary from theater to theater and during the course of a war) and the enormously difficult methodological problems involved in determining a state's objectives or intentions. It also confounds the two important concepts of the motivations of statesmen and the offensive/defensive balance, and deprives the latter of any independent meaning.
5. Several aspects of Wright's definition are open to question. The offensive character of a weapon system cannot be judged only by its effectiveness against an enemy unit like itself, as examples of submarines or antitank weapons clearly indicate. Wright's focus on commerce as the object of naval warfare (p. 793) can be questioned on the grounds that the primary aim of seapower is the defeat of the adversary's naval forces (Mahan, 1957). Nor is the notion of an attack on enemy morale very useful.

6. Similarly, it is not at all clear that territorial conquest and defeat of enemy forces should both be included in a single definition, for they do not necessarily go hand in hand. One obvious problem concerns naval and air warfare, where the defeat of enemy forces may be directed toward control of sea lanes or control of the air, but certainly not territorial conquest *per se*. Even in land warfare, however, one can conceive of a strategy of deep territorial penetration that aims to bypass enemy military forces rather than defeat them (see, for example, Vigor, 1983), or a strategy aimed to defeat enemy forces without seizing territory. The latter is also relevant to the nuclear age, for a counterforce strategy may be aimed at destroying enemy forces for its own sake and independently of both territorial control or even coercion.
7. When Clausewitz (1976:114) argues repeatedly that the defense is the stronger form of warfare, he conceives of defense not in static terms as the warding off of blows, but rather as a dynamic conception of a holding action until conditions are ripe for a counter-offensive (Boggs, 1941:71; Howard, 1983:54).
8. One objective indicator of such movement is the relative rates of advance of armies in different periods. Record (1973), for example, has surveyed historical rates of armored advance in this century. These rates are affected as much by the numbers of troops on each side, geographical terrain, and political considerations as they are by the balance of military technology, so that its use as an indicator of the offensive/defensive balance is open to question.
9. Wright (1965:808) notes that Fuller also includes holding power (the ability to hold captured territory) as an important element of an offensive weapon. If newly acquired territory cannot be held there is little net gain for the offense, yet by definition it is even more important for the defense to hold territory. Wright (1965:808) also argues that rapidity of fire is another weapons characteristic that provides an advantage to the defense, but it is not clear whether this generalization applies beyond the case of the machine gun and the static warfare of the late 19th and early 20th centuries. In addition, Wright (1965:808) argues that the range of a weapon contributes a net advantage to the defense because it keeps the offense at a distance and restricts its mobility. But long-range weapons may contribute equally to the penetrating power of the offense by weakening defensive fortifications from a distance. Boggs (1941:86), for example, argues that while heavy mobile artillery contributes to both the tactical offensive and defensive, its striking power against enemy fortifications dominates, thereby favoring the offense. More generally, Fuller (1945:9) argues that range is the dominant characteristic of an offensive weapon.
10. A more esoteric example of tactical doctrine precluding the optimal use of available military technology can be found in McNeill (1982:9–11). The Asians' use of war chariots as fighting platforms as well as for transport increased their mobility and firepower beginning in the 18th century BC, but the Europeans lost these offensive advantages because of a doctrine which led them to dismount from the chariots and fight on foot as infantry.
11. Note that the greater the extent to which the offensive/defensive balance is affected by doctrinal considerations, the less its utility as a systemic-level concept.
12. One obvious problem here is what is meant by 'overcoming an adversary'. Here I mean the minimum ratio of forces necessary to give the attacker a higher probability of winning than losing, recognizing that stalemate is also a possible outcome. Other definitions are possible, of course (a 50% chance of victory, or of avoiding defeat, for example), but the specific criterion is less important than its consistent application. It is recognized, of course, that we must make the *ceteris paribus* assumption in order to control for asymmetries in terrain, logistics, morale, training, and leadership, which are also important.
13. The fact that a one-to-one ratio is widely regarded to be insufficient for attack provides a basis for an interpretation of the common argument that the advantage in war always lies with the defense (Clausewitz, 1976:114, 128; Machiavelli, *Discourses*, bk 3, ch. XLV; Dupuy, 1980:326). To say this does not mean, however, that the extent of the advantage to the defense is constant.
14. The theoretical consequences of an incentive to strike first have been thoroughly explored by deterrence theorists (Ellsberg, 1960; Schelling, 1960; Wagner, 1983).
15. This point was emphasized to me by Harrison Wagner.
16. This survey begins in the late Middle Ages because references to the offensive/defensive balance in earlier times are few and scattered, as are references to non-Western systems.
17. This assumes that the authorities consulted reflect a representative sample of viewpoints and they make independent evaluations of the offensive/defensive balance over time. Admittedly, there may be some bias in the authorities consulted in the following survey, for all are Anglophones who deal primarily with land warfare and basically ignore naval and air considerations. The land focus is not a problem, for most theoretical treatments of the offensive/defensive balance define it in these terms. Nor is there good reason to believe that continental military historians would reach fundamentally different conclusions, particularly since they also would tend to ignore naval and air considerations. More serious, however, is the question of independent measurement. Presumably, there is some reciprocal and cumulative relationship between these authorities, so that their classifications of the offensive/defensive balance are

not truly independent. This is particularly likely given the absence of rigorous nominal or operational definitions guiding their analyses. It is in this sense that a greater variety of sources might be valuable. The relative absence of explicit references to others' work, however, and the inconsistency of their conclusions, suggests that this problem is not too serious.

18. Gilpin (1981:62) argues that the 14th century marked a resurgence of offensive capabilities because of the invention of gunpowder and artillery, but most would regard his view as premature by a century.
19. One exception here may be Montross (1960:327), who implies that by 1670 there may have been 'advantages to be gained by striking first'.
20. One exception is Quester (1977: ch. 11–12), who seems to suggest that the balance may have favored the defense.
21. There is considerable evidence contradicting the assertion that the entire German General Staff recognized the superiority of the offensive (Howard, 1976: 131–33; Quester, 1977: ch. 12).
22. The year 1495 marks the origins of the modern great power system (Levy, 1983a: ch. 2). The period before 1495 is excluded because the basic criterion of a European sovereign state system is not satisfied, so that earlier warfare cannot easily be compared with modern war behavior.
23. For this analysis the period 1850–1890 is liberally credited to the defense and 1790–1815 is credited to the offense, rather than being labelled uncertain. The 1495–1525 period is classified as offensive, and the 1650–1740 period is classified as defensive. The periods 1525–1650, 1740–1850, and 1890–1945 have been classified as uncertain.
24. More technically, the offensive/defensive balance is a multidimensional concept, but theories should be based on unidimensional concepts if at all possible (Shively, 1974: ch. 3).

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