
Continuity and Change in the Evolution of Warfare

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After a millennium of frequent violence between polities, there is much discussion of the possibility of a turning point in the history of warfare. Hypotheses about the obsolescence of war among advanced industrial states deriving from the nuclear revolution (Gaddis 1987; Jervis 1989) have been reinforced by arguments about the pacifying effects of increasing economic interdependence (Keohane and Nye 1977; Rosecrance 1986), the rapid spread of democratic political systems (Doyle 1983; Russett 1993; Ray 1995), the end of the Cold War, the "end of history" (Fukuyama 1992), and changing attitudes toward war in the West (Ray 1989; Mueller 1995).

Although there has indeed been a "long peace" (Gaddis 1987) among advanced industrial states since World War II, this period has been anything but peaceful for many of the world's peoples. It is more accurately described as a long great power peace, but one that has been accompanied by a shift in the concentration of war from Europe to other regions of the world (Singer 1991). This shift in warfare away from Europe has been reinforced by the collapse of the Soviet empire and by the increasing salience of ethnonational and religious identity, which has contributed to the steady occurrence of civil and regional wars in the last decade (Wallenstein and Sollenberg 1999; Holsti 1996). This has led some to suggest that the wars between states and political ideologies of the last several centuries (Luard 1986) may give way to a "clash of civilizations" defined in terms of cultural identity (Huntington 1996).

These changes in where war is fought, by whom, and over what issues may be accompanied, some argue, by a dramatic if not revolutionary change in how wars are conducted. Some scholars and policy analysts argue that "low-intensity conflict" may increasingly replace conventional warfare (Van Creveld 1991). Others argue that conventional wars themselves—at least those that involve technologically advanced states—are being radically changed by a revolution in information and communications. Some suggest that this technological revolution may generate a much broader revolution in military affairs that will affect

the way militaries are organized, the conduct of civil-military relations, and the very nature of international conflict (Krepinevich 1994; Cohen 1996; Biddle 1998).

The enormous uncertainty surrounding the evolution of the global political system and the future of international war is all the more reason to place current debates in a broader historical context and to examine current trends and future scenarios in terms of long-term patterns and trends in war. For these purposes we begin with a descriptive analysis of historical patterns and trends in warfare. We start with the origins of the modern system at the end of the fifteenth century¹ and continue through the last five centuries. We focus on secular trends and avoid the more problematic question of cyclical trends in war.² We then undertake a more detailed analysis of trends in international war during the last two centuries of the modern system, with particular attention to the periods since World War II and since the end of the Cold War. We interpret these trends in terms of some of the major military, economic, and sociopolitical revolutions of the past, and we use this interpretation of past and current trends as a point of departure for speculation about the future of war in a rapidly changing global system.

Historical Trends in War

We define war as large-scale organized violence between political systems,³ and we distinguish among different types of war depending on the types of political units involved: wars between great powers (great power war, or major-war), wars between great powers and other states (major-minor war), wars between smaller states (minor-minor war), wars between states and "non-members" of the international system (which Singer and Small [1972] label "extra-systemic" or imperial or colonial wars and which we define later), and civil wars within states. An important subset of great power wars is the small set of "general" or "global" wars that involve nearly all of the great powers, that are long and costly in human and economic terms, and that have a profound impact on the structure and processes in the global system (Levy 1985; Rasler and Thompson 1994).

Our quantitative analyses of historical trends in war for the period since 1815 rely on the Correlates of War (COW) data on interstate, extrasystemic, and civil wars (Singer and Small 1972; Small and Singer 1982). We supplement this with the SIPRI/Uppsala data for the period since 1989.⁴ For the period before 1815 we rely on data from Levy (1983; Levy, Morgan, and Judd 1990) and for some questions, from Wright (1965) and Sorokin (1937). Because this is not the place for a major data-collection effort, we restrict our analyses of trends spanning the last half millennium primarily to great power wars and general wars and save a more thorough treatment of trends in different types of war for the period since 1815.

Great Power War since 1495

Great powers play a central role in the diplomacy and warfare in any international system, and that has certainly been true of the modern international system that emerged in Europe in the late fifteenth century and remained centered in Europe until the twentieth century.⁵ Taylor (1954, xix) represents the conventional wisdom, arguing that "the relations of the Great Powers have determined the history of Europe."⁶ The great powers have been involved in a disproportionately large number of European wars over the last five centuries. Of the hundreds of European wars since 1480 that Quincy Wright (1965) identifies in his classic *A Study of War*, 70 percent involve at least one of the great powers. France alone has participated in 47 percent of the 2,600 battles involving European states. Moreover, states have had a significantly higher rate of war involvement during the years when they were great powers than when they were not (Levy 1983, 3).

This pattern has continued to hold for the last two centuries. Small and Singer's (1982, 71-72) compilation of all international wars since 1816 indicates that 60 percent of the interstate wars and 75 percent of "extrasystemic" (imperial and colonial) wars have involved a great power.⁷ The great powers have also accounted for a disproportionate amount of the loss of life from interstate war.⁸ Moreover, nearly 80 percent of fatalities from interstate wars that involved at least one great power were from the ten general wars (or world wars) that involved nearly all of the great powers (Levy 1983, 1985).

It is clear that for much of the last five centuries the great powers have played a key role in international warfare and that much of that warfare, like the great powers themselves, has been centered in Europe. Within this European-centered great power international system there have been some clear trends in the frequency and seriousness of war.⁹

One such trend is the unambiguous decline in the frequency of great power war (which involves at least one great power on each side of the conflict) over the last five centuries. This is reflected in figure 1, which shows the number of great power wars for each twenty-five year period since 1500. This decline has been nearly continuous, with each century experiencing fewer great power wars than the previous one, the only exception being the upturn in the twentieth century. There were twenty-two great power wars in the sixteenth century, eleven in the seventeenth century, eight in the eighteenth century, five in the nineteenth century, and six in the twentieth century.¹⁰ Aggregating the data slightly differently, we find that only about 20 percent of the half-decades since 1815 have witnessed the initiation of a great power war, compared with nearly 60 percent in the previous three centuries.

In terms of the relative absence of great power war, the nineteenth century was the most peaceful period of the modern system. It is true that there was a

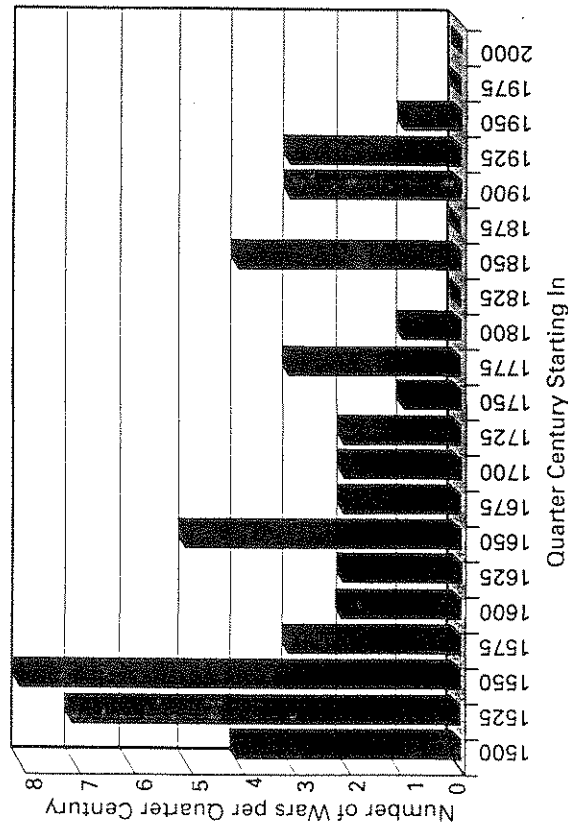


Fig. 1. Frequency of great power wars, 1500-2000

high concentration of great power wars between 1854 and 1870, but these wars were fairly limited in their severity. Moreover, the nineteenth century was the first to have substantial periods of time without a great power war, as reflected by the absence of war in the second and fourth quarters of that century. The great power peace of the late twentieth century is even more profound and constitutes the longest period without a great power war in the last five centuries of the modern system (Gaddis 1987).¹¹

It is clear, then, that the frequency of great power war has been declining throughout most of the last half millennium, with a slight upturn in the twentieth century. Moreover, this trend was underway not only long before the nuclear revolution but before the industrial revolution as well, a point to which we will return in our interpretive section.

Although the frequency of great power war has been declining over time, those wars that do occur have been getting more serious in several important respects. The most widely used indicator of the seriousness of war is its *severity*, or battle-related deaths.¹² The severity of great power wars has increased fairly rapidly over time, to the point that it has doubled every 110 years or so (Levy 1983, 292).¹³ There has also been a rather sharp increase in the *extent* of war, defined as the number of great power participants in a war.¹⁴ A closer look at the data shows that whereas no war involved more than four great powers before the Thirty Years' War¹⁵ after that time over ten wars involved more than four great powers, and the two world wars of the twentieth century involved

seven and eight great powers, respectively. The proportion of great power wars that expand into larger wars involving several powers has increased over time.¹⁶ Whereas less than half of the great power wars before the Congress of Vienna expanded into wars involving three or more great powers, two-thirds of the wars since then have expanded.

Increases in the severity and extent of war are not associated with comparable increases in the duration of war. The duration of great power war is basically unchanged over the last five centuries.¹⁷ Since the Napoleonic Wars no great power war has lasted longer than six years, whereas prior to that there have been over ten wars lasting ten years or more and three wars exceeding fifteen years in length, but a number of very short great power wars as well (Levy 1983, chap. 6). Although the average great power war is no longer than before, it is clear that relatively protracted great power wars are a thing of the past. Any analysis of trends in the duration of war over time may be extremely sensitive to measurement procedures, however, and we should be cautious in interpreting our findings.¹⁸

Given the unchanging duration of the average war and the sharply increasing extent of war, it is perhaps not surprising that the *magnitude* of war—defined in terms of the nation-years of war—has increased gradually over time. It is interesting to note that all but one of the ten most serious wars along this indicator occurred between 1625 and 1815.¹⁹ Many of these high-magnitude wars are *general wars* that involved nearly all of the great powers, extended duration, and enormous casualties. Following Levy's (1985) identification of ten general wars over that period, we find no discernable trends in general wars other than that they have involved an increasing number of casualties over time.²⁰

The evidence is fairly strong that great power wars have been diminishing in frequency but increasing in seriousness over the last five centuries of the modern great power system.²¹ This raises the question of whether this inverse relationship between the frequency and seriousness of war holds for shorter periods of temporal aggregation. If we broaden the analysis to include all wars involving a great power, including imperial and colonial wars, we find modest evidence in support of an inverse relationship, both for the system as a whole and for individual great powers (Levy and Morgan 1984; Morgan and Levy 1990). This is consistent with the conventional wisdom that wars are either frequent but moderate in intensity or infrequent but more serious. One exception to this relationship is the nineteenth century, for which both the frequency of warfare and the severity of wars were fairly low.²²

International and Civil Wars, 1815-1995

Figure 2 shows the frequency of interstate, extrasystemic, and civil war, aggregated by decade, for the period since 1815.²³ Interstate wars account for 29 percent of the 236 wars in the system, with the remainder being extrasystemic and

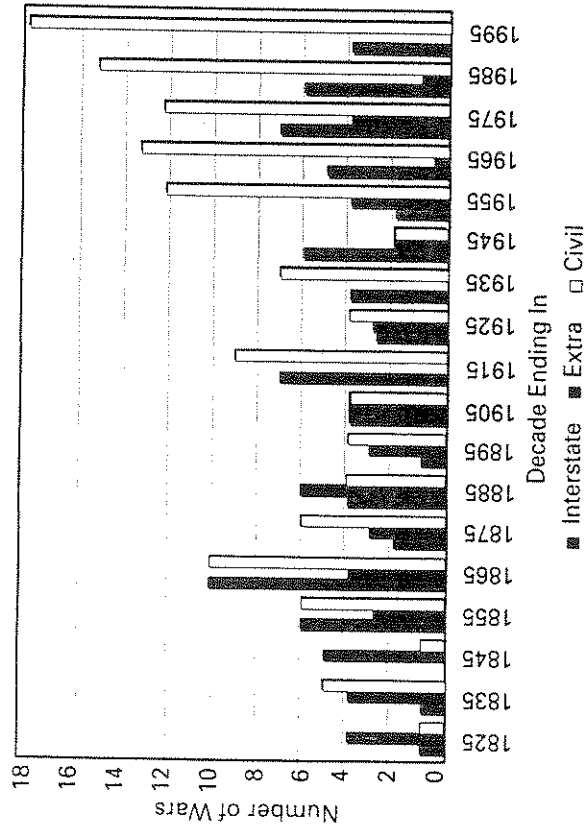


Fig. 2. Frequency of interstate, extrasystemic, and civil wars, 1816–1995

civil wars. This suggests that, in the nearly two-century period since the Congress of Vienna, the majority of organized political violence falls outside the realm of interstate war. This appears to represent a change from the three-century period before Vienna, although currently available data on imperial and civil wars in that period are not sufficiently complete to permit a clear comparison.

Although figure 2 suggests that the incidence of war—and particularly of civil wars—has been increasing, this is in part a statistical function of the increasing number of opportunities for war that have been created by the rapid increase in the number of states in the system.²⁴ When Small and Singer (1982, 293–94) controlled for the increasing number of states in the system, they found that “there is no evidence that international war has been on the increase.”²⁵ Nor is there any evidence that civil wars have been on the increase.

Turning to the severity of war, we find that the increasing severity of the most serious wars in each period gives the impression that the overall severity of war has been increasing over the last two centuries. This increasing severity of war would disappear, however, if one controlled for the number of states in the system, and in fact Small and Singer (1982, chap. 18) conclude that there has been little significant increase in either the frequency or seriousness of international or civil war in the system since 1815.

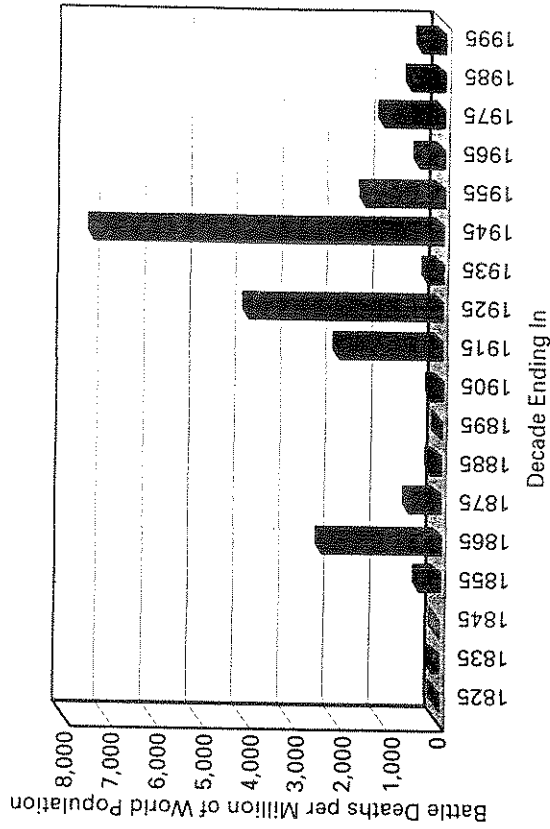


Fig. 3. Severity of all wars, 1816–1995

Controlling for the number of states in the system may not be the best way to tap the changing impact of war. Because a disproportionate number of new states are relatively small in population, their increase in number does not capture the opportunities for battle-related fatalities. Therefore, a population-based measure may be more appropriate. Figure 3 shows aggregate fatalities from the three types of wars as a ratio of fatalities to world population for the 1816–1995 period. Figure 4 provides a closer view of the 1945–95 period.

As shown in figure 3, the three periods of most severe warfare coincide with the Chinese civil wars of the 1860s and the two world wars of the twentieth century.²⁶ The lowest levels of battle-related deaths per population are found in the nineteenth century, which reinforces the conventional wisdom that the nineteenth century was the least warlike of any over the last five centuries. It is also clear that the severity of war has been increasing over time, at least until the middle of the twentieth century. The average number of deaths per million world population per ten-year period jumped from 455 in the period 1816–1905 to 1,810 in the period 1906–85, an increase of 300 percent. But this increase is not entirely a function of the two world wars. Eliminating the outliers—the Chinese civil wars and the two world wars—we still find that in terms of severity or intensity war was three times more destructive in the twentieth century than in the nineteenth century.²⁷

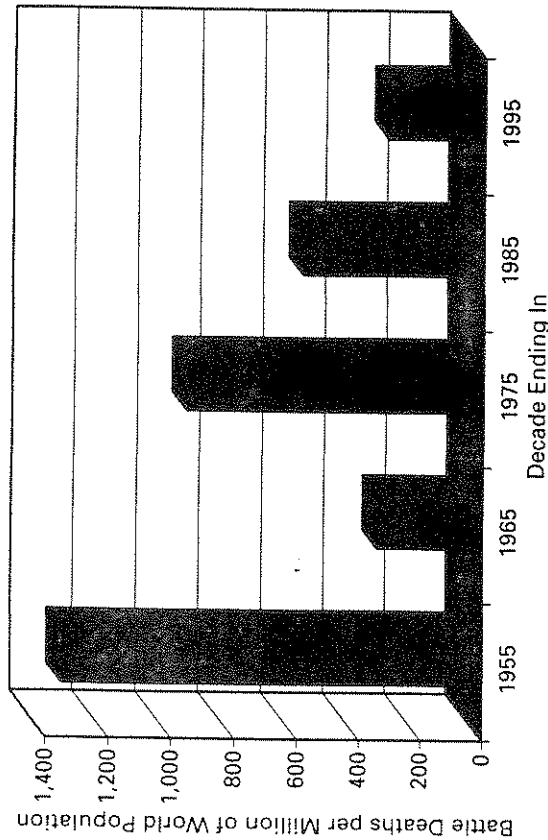


Fig. 4. Severity of all wars since 1945

The period since 1945, misleadingly described as the long peace, has witnessed a substantial amount of violence. In fact, two of the five decades since the end of World War II (1946–55 and 1966–75), which include the Korean War and the Vietnam War, rank among the bloodiest since 1816, with each of these periods accounting for over three million battle deaths. The Iran-Iraq War was also enormously destructive.

The analysis of the severity and intensity of warfare in the period since the end of the Cold War is more difficult, in part because of questions regarding the validity of existing data sets given the changing nature of warfare. Nonetheless, a preliminary analysis based on our data suggests that the decade from 1986 to 1995 has been the most peaceful ten-year period since World War II.²⁸ This is illustrated in figure 4. Our data show that from 1986 to 1995 war-related deaths fell by nearly one million worldwide compared with the previous decade.²⁹ This decline is more dramatic if we control for the growth of world population. Between 1986 and 1995, 279 people per million world population perished in battle-related deaths, compared with 522 per million in the 1976–85 period and 928 per million in the 1966–75 period. In the twentieth century as a whole only the interwar period, 1926–35, had fewer battle-related deaths than the 1986–95 decade that encompassed the end of the Cold War.

If this analysis is correct, the common assumption that the spread of ethnonational and civil wars in the 1990s has contributed to an increase in the frequency and severity of war may not be true.³⁰ A full resolution of this question,

however, requires a more careful examination of the data and the coding rules applied to the increasingly varied forms of organized violence that has occurred since the 1980s.

Interpretation of Historical Trends

Great Power War

We have seen that the frequency of great power war has increased slightly in the twentieth century after four centuries of continuous decline; that the average duration of great power war has not diminished, although long wars (lasting over a decade) no longer occur; and that great power wars have involved an increasing number of belligerent powers and nation-years of war and have become increasingly violent in terms of absolute and per capita battle deaths. The unambiguous conclusion that great power wars have become less frequent but more serious or destructive is not surprising, but we still need to explain these trends.

One plausible hypothesis for the declining frequency of great power war is that in the aggregate and in the long term the expected benefits of great power war have not kept up with the rising human and economic costs associated with the increasing destructiveness of war. For reasons discussed in the next section, warfare has involved enormous increases in casualties and human suffering, in the physical destruction of industrial transportation and communication systems, and in opportunity costs for societies facing growing social demands. The greater tendency toward external intervention in great power war has further raised the costs or reduced the potential benefits from war, whether by adding the military burden of an additional enemy or by necessitating the sharing of the spoils of war with an ally. The declining legitimacy of war by the middle of the twentieth century (Knorr 1966; Mueller 1995, chap. 9), at least among advanced industrial states, has increased diplomatic and domestic political costs of war, as has the related spread of democracy (Russett 1993; Ray 1995). Finally, concerning the benefits of great power war, the changing bases of national power and the declining value of territorial conquest (Knorr 1966; Van Evera 1990–91), along with the increasing congruence between state territorial boundaries and national-identity groups for the leading states, have reduced the potential benefits of war, at least for the great powers.³¹ These increasing costs of great power war relative to its perceived benefits have reduced its utility as a rational instrument of state policy and largely account for its declining frequency.³²

The findings that the average duration of great power war has not declined more dramatically is more of a puzzle. We might have expected that improvements in communications and logistics would have increased the speed of military operations on the battlefield and that innovations in military technology

and the increasing destructiveness of military conflict would have increased the costs of war. Each of these factors would presumably force an earlier termination of the hostilities.

There are other variables, however, that counteract this tendency. Although the costs of war have become much greater, the gradual industrialization of agricultural societies has increased states' economic capacities to sustain a war and bear these costs. Another plausible hypothesis is that the increasing number of great powers participating in each war creates military coalitions of greater staying power. The military weakening of one ally need not end the war effort, and the economic support that allies can provide each other further increases the ability of each ally to continue in the war (Kennedy 1987). One could also hypothesize that despite the enormous changes in military technology the defense has managed to keep up with the offense, so that it takes equally long to obtain a decisive advantage on the battlefield (Jervis 1978; Lynn-Jones 1995).

These tendencies to prolong war are reinforced by internal political considerations. At the organizational and bureaucratic level, the growth of larger and more powerful national-security bureaucracies has increased the extractive capacity of states and their ability to finance a war effort through direct taxation, borrowing, or deficit financing. The growth of state bureaucracies has also created a set of vested interests and organizational routines that make it more difficult to reverse policy and to terminate wars (Iklé 1971). Similarly, at the societal level the decline of dynastic legitimacy, the growth of democracy and societal influences more generally, the rise of nationalist pressures, and the occasional tendencies for democracies to adopt a crusading spirit in war (Doyle 1983) combine to make it ever more difficult to terminate inconclusive wars, however costly.

Considering the extent of war, it is significant that an ever-increasing number (and proportion) of great powers have been participating in great power wars. One could hypothesize that this derives in part from the increasing interdependence of the modern great power security system.³³ As the great powers evolved from dynastic-territorial states to nation-states, their state interests, as well as their capabilities to project power in defense of those interests, tended to expand, and their commercial relationships also became closer. The great powers increasingly came to perceive their own strategic and economic interests as dependent on power relationships in the system as a whole and were increasingly likely to intervene in external wars to maintain a balance of power or their own influence and prestige. Hence, the extent (and the magnitude) of great power war has increased over time.

The Increasing Severity of Great Power War

This section considers the increasing destructiveness of war as reflected by its increasing severity in terms of battle-related deaths, both in absolute terms and

relative to population or nation-months of war. The conventional wisdom is that the primary reason for the increasing severity of war is technological. We will argue, however, that political, social, and attitudinal changes in state and society are equally important.

At the level of technology there have been major changes in the destructive power of weapons: in their range, accuracy, volume of fire, mobility, and penetrability; and in the speed and efficiency of military transport and communications systems that bring humans and machines into battle. These qualitative changes in the nature of military technology have been reinforced by advances in industrial production, which have generated increasing economic capacity to produce a larger quantity of weapons and support systems as well as technological spin-offs with military applications.

Although some of these changes have been evolutionary in nature, others have been more sudden, owing to the occurrence of "military technical revolutions."³⁴ Most of these military technical revolutions affected operational doctrine, the deployment and use of military forces, and the offense/defense balance. Some of these revolutions have gone beyond the tactical, operation, and strategic levels, however, to trigger revolutions in military affairs. These encompass broader changes in the organization of military bureaucracies, strategic doctrine, civil-military relations, the organization of society and the economy, and societal attitudes toward war and the military. In the following discussion we focus on the technological components of military revolutions and later consider the broader societal impact. Our aim is not to identify all military revolutions over time but to emphasize those that have had the greatest impact on the severity of war.³⁵

One military revolution that had a profound effect on warfare beginning in the fifteenth century and continuing into the sixteenth century was what Rogers (1993) calls the "Artillery Revolution."³⁶ The lengthening of gun barrels increased the range and destructiveness of artillery, the coming of gunpowder increased its destructive power, and metallurgical breakthroughs (along with corning) made artillery less expensive and therefore more widely available. Taken together these changes increased the severity of war on the battlefield, added to the power of the offense, made conquest easier, and facilitated the territorial expansion and consolidation of a small number of great powers (McNeill 1982).

The increasing power of the offense was soon countered by the development of a new defensive fortification system, the *trace italienne* (Parker 1988; Lynn 1995). The *trace italienne* differed from traditional fortifications in that walls were lower and thicker to better withstand bombardment. It also contained arrow-shaped bastions that provided flanking fire at every point of approach. The diffusion of the *trace italienne* across Europe and the consequent increase in the importance of sieges led to changes in the composition of

armies: an increase in the proportion of infantry, a decrease in the proportion of cavalry, and the emergence of specialized engineers who were trained in the science of fortification and siege craft (Parker 1988, 10–13, 156; Lynn 1995, 172–73).

The impact of these technological advances in artillery and gunpowder is difficult to separate from tactical and doctrinal innovations that inevitably followed in order to exploit the new technology. The slow rate of fire of muskets (which had replaced the longbow by the mid–sixteenth century) led to the development of linear tactics, first by Maurice of Nassau and then by Gustavus Adolphus, which produced continuous fire and further increased battlefield casualties by the end of the sixteenth century.³⁷ These tactical innovations placed a greater emphasis on training and drill, which led to the establishment of permanent armies that in turn expanded in size both to absorb larger casualties and to better execute wide-ranging strategic movements required by new tactical systems. The size of armies expanded dramatically during the Thirty Years' War and then again toward the end of the seventeenth century (Parker 1995; Lynn 1995). These developments had profound political consequences, known generally as the “military revolution” of the sixteenth and seventeenth centuries (Rogers 1995).³⁸

The next major military technical revolution did not come until the mid–nineteenth century, when the combination of the industrial revolution, the development of the steam engine,³⁹ and the introduction of railroads and telegraphs led to a “Land Warfare Revolution” (Krepinevich 1994, 34) that dramatically transformed the nature of war and enhanced the effectiveness of the mass army that emerged from Napoleonic warfare.⁴⁰ The railroad greatly enhanced rapid mobilization, strategic mobility, the ability to fight two-front wars, and the capacity to sustain larger armies in the field for extended periods of time; the telegraph further enhanced the ability to mass forces quickly and to coordinate simultaneous military operations.⁴¹ Rifling improved the range and accuracy of small arms and artillery, the introduction of repeating rifles added to the volume of fire,⁴² and continued improvements in mass production made these weapons more widely available. The result was a substantial increase in the destructiveness of war on the battlefield (Millis 1956, chap. 2; Fuller 1961, chap. 5).⁴³

By the end of World War I another military technical revolution was underway, consisting of, simultaneous revolutions in mechanization, aviation, and information.⁴⁴ Advances in mechanization (Millis 1956, chap. 4) and information had led to important changes on the battlefield by the end of World War I, but all of these changes were accelerated by new developments after the war, including improvements in the internal combustion engine, aircraft design, and radio and radar. These facilitated the integration and coordination of larger-scale military movements, led to new kinds of military formations such as the panzer division, the carrier battle group, and the

long-range bomber force, and made possible the blitzkrieg, carrier aviation, strategic aerial bombardment, and modern amphibious warfare (Krepinevich 1994, 36). The result was another significant increase in the destructiveness of war.

The nuclear revolution in the mid–twentieth century, coupled with the development of long-range strategic delivery systems, increased the potential human and economic destructiveness of war by several orders of magnitude. This allowed states to do an enormous amount of damage to adversary populations without first defeating the adversary's military forces (Schelling 1966, chap. 1). It created a situation in which, for the first time, both sides in a crisis would almost certainly anticipate that the enormous costs of war would far exceed any potential benefits, and strategic deterrence came to dominate the environment of the Cold War.⁴⁵

Military technical revolutions cannot alone, however, fully explain the increasing destructiveness of great power wars in the last five centuries. Change, sometimes revolutionary change, at the social, economic, political, organizational, and cultural levels has had a significant impact on the increasing severity of war over time. The very concept of the “revolution in military affairs” suggests that the impact of a military technical revolution often goes beyond military tactics and strategy to include the nature of military organizations, state structures, civil–military relations, and society as a whole and that these nonmilitary developments, once underway, have an independent and prolonged impact on the nature of warfare.⁴⁶ Let us consider some of the political and social consequences of military technical revolutions in history, leaving aside the question of whether these consequences were sufficient to constitute a revolution in military affairs.

The revolutions in artillery and gunpowder and the tactical and doctrinal innovations that followed from them had profound political consequences. They ended the invulnerability of the castle and walled cities and the security complex built around them, undermined the social position and political influence of the mounted knight,⁴⁷ and contributed to the continuing shift in power from the nobles to the king.⁴⁸ This, combined with an increased power of the offense that facilitated the territorial expansion and consolidation of a small number of great powers, contributed to the development of the modern state system (Roberts 1955; Tilly 1975; Parker 1988).

With the consolidation of a modern state system came a broadening of the interests for which wars were fought and consequently an expansion in the means that were developed to fight them. The wars for the personal honor, vengeance, and enrichment of kings and nobles that characterized the Middle Ages (and that contributed to the frequent but limited nature of those wars), for example, were increasingly replaced by the use of force as an instrument of policy for the achievement of political objectives. This rationalization of mili-

tary power under the state began in the late fifteenth century and grew with the increasing centralization of power in the state. It became firmly entrenched after the legal codification of the existing sovereign state system at Westphalia and a central element in the Clausewitzian conception of war (Clausewitz [1832] 1976). As interests shifted from personal gain to the territorial aggrandizement of the state and then to the national ambitions of an entire people with the French Revolution, the severity of war expanded as well (Osgood 1967; Levy 1982).

As already noted, the revolutions in the technology of artillery and gunpowder also led to the tactical innovations of Maurice of Nassau and Gustavus Adolphus. These contributed to a greater emphasis on training and drill and discipline, which led in turn to the establishment of permanent armies and the expansion in the size of armies.⁴⁹ This was costly, as was the building of new fortification systems, and the increasing cost of war and preparation for war led to fiscal crises in many states.

Monarchs responded to these fiscal crises in different ways,⁵⁰ but the process often involved an expansion of taxation systems, and the state bureaucracies needed to administer these systems. The result was a growing centralization of state power and an increasing ability of states to extract societal resources and use them for the expansion of the military, which contributed to the increasing severity of war. Not all states were equally successful in solving their fiscal crises, however, and variations in success contributed to the rise and fall of great powers (North 1981; Rasler and Thompson 1989; Downing 1992).

The commercialization of war beginning in the early seventeenth century (Howard 1976) contributed further to the power of states and their ability to make war. Driven by the realities of power and wealth in the international system, by the institutional access of certain private interests to the state, and by prevailing mercantilist ideology, the state and the commercial classes forged an increasingly symbiotic relationship.⁵¹ Commerce generated the wealth necessary to sustain war, and war in turn became a means of expanding commerce (Viner 1948). In Clausewitzian terms commerce was a continuation of war, and war was a continuation of commerce (Howard 1976, 47).

The merchants were always more enthusiastic about naval and colonial wars than major European wars, however, and this enthusiasm for war further diminished as the mercantilist system was replaced by free trade in the late eighteenth century. Borrowing on international capital markets became easier (Thompson 1988), and the accumulation of a "full treasury" (Blainey 1988, chap. 6) was less necessary for the financing of war. The efficiencies of a liberal, free-trading international economy generated additional wealth that contributed to more powerful armies and the increasing destructiveness of war.

At the end of the eighteenth century the rise of nationalism and popular ideology, the institution of universal conscription, the comprehensive economic

mobilization of society, and the creation of the "nation in arms" combined to constitute a revolution in military affairs that contributed to a quantum increase in the size of armies in the field and consequently in the casualties of war (Osgood 1967; Millis 1956, chap. 1; Preston and Wise 1979, chap. 12). This was a revolution driven more by politics than by technology. Napoleon's genius was to integrate quite modest changes in military technology with tactical and organizational innovations, the industrial revolution, and mass conscription based on unprecedented popular support for the expansion of state goals and the military effort needed to achieve them.⁵²

The consequences of this popularization of war (Osgood 1967, 51)⁵³ were enormous; people were much more willing to fight for the nation than for the crown (Posen 1993), and the size of armies and the number of casualties that commanders and political leaders were willing to tolerate increased substantially. As Marshal Foch proclaimed with the end of the Prussian offensive at Valmy in 1792, "The wars of Kings were at an end; the wars of peoples were beginning" (quoted in Osgood 1967, 52). War began to acquire, for the first time in centuries, a crusading spirit. As Churchill declared in 1901, anticipating a century of total war, "The wars of peoples will be more terrible than those of kings" (quoted in Gilbert 1967, 21–22).

The ability of states to use these expanding resources was furthered by the professionalization of military power in the late nineteenth century (Osgood 1967; Millis 1956, chap. 3; Huntington 1957, part 1; McNeill 1982). Professionalization refers to the development of a peacetime military establishment directed by a new professional military elite that was independent of the aristocracy and usually headed by a general staff system, run according to new principles of scientific management, and supported by a system of military academies. Although some elements of the professionalization of military power can be seen as far back as the early seventeenth century (Roberts 1955), their fullest impact came at the end of the nineteenth century. While these developments increased the efficiency of the conduct of war, they also enhanced the legitimacy of the military profession in some states and contributed to the trends toward militarism, to the point that in Germany in particular the values of the military subculture became accepted as the dominant values of society (Howard 1976, 109–10; Vagts 1959).

Together, these trends culminated in World War II with the conversion of the entire society to the preparation for war or the deterrence of war. This involved the harnessing, for the first time, of the entire scientific, technological, industrial, and educational capacities of the nation directly for the military effort. This mobilization of the intellectual and educational, as well as material and social, resources of the nation for the purposes of enhancing military power continued in peacetime as well as in wartime, at least for the leading states in the system. This "totalization of war" continued well into the Cold

War. It was reflected in everything from the emphasis on science education in U.S. high schools to the pattern of research grants from the government and private funding agencies to the more general impact of the Cold War on Western culture (Melman 1974).⁵⁴

Implications for the Future

It is now commonplace to argue that world politics in general and international conflict in particular are changing and that consequently we cannot extrapolate past trends onto the future. The literature on the future of war is extensive, and although this is not the place for us to make a major contribution to it, a few comments would be appropriate.

It is clear, first of all, that technological change continues to have a significant impact on the nature of warfare. The nuclear revolution will continue to significantly reduce the probability of an all-out war between the leading nuclear and industrial powers to an extremely low level, and the risk that conventional wars could escalate to the nuclear level will significantly reduce the probability of conventional or even low-level wars between the most powerful states in the system (Jervis 1989).

There are many who argue that we are currently in the early stages of another military technical revolution, the "information revolution," which is emerging from new developments in microelectronics (Krepinevich 1994; Nye and Owens 1996; Cohen 1996).⁵⁵ The course of the information revolution is impossible to predict with confidence, but it is likely at the operational level to involve tremendous increases in the ability of military organizations to detect, identify, track, and engage a larger number of targets over a larger area in a shorter period of time and with greater precision and lethality (Krepinevich 1994, 41). The information revolution will also lead to efforts to counter these developments, and in fact a primary target of new military systems is likely to be adversary information systems.

The broader military consequences of the potential information revolution are even more difficult to predict. One possibility, however, is that, unlike earlier military technical revolutions, which increased the destructiveness of weapons systems and the severity of war, the information revolution may result in a decrease in the severity of war or at least the severity of wars involving states at the forefront of new informational technologies. In fact, many proponents of the information-based military revolution in the United States argue that it will help deter or defeat traditional military threats at relatively low cost (Nye and Owens 1996, 20). This may have important consequences for the likelihood of Western involvement in war, where sensitivity to casualties has become an increasingly important political issue (Luttwak 1995).

The information-based military revolution, if it progresses, could have a potentially significant impact on the balance of power in world politics. In the short term it is likely to bestow disproportionate advantages on the United States, given U.S. dominance in key communications and information-processing technologies and its unmatched ability to integrate complex information systems into a "system of systems" (Nye and Owens 1996; Friedman and Friedman 1996). This helps to explain both the Soviets' initial concerns about the impending information revolution and the efforts by many in the U.S. policy community to promote and accelerate that revolution.

Over time, however, the new technologies will undoubtedly be emulated by other states,⁵⁶ and it is not clear how long the United States will be able to maintain its dominant position in information-based systems. It is also likely that different states will adopt and incorporate these technologies at different rates and in different ways—depending on their strategic imperatives, economic capacities, political and organizational cultures, vested interests, and strategic visions—so that it may not be easy for the United States to control the direction of the information revolution (Krepinevich 1994, 42).

The organizational and cultural levels are particularly important. The development and military application of information technologies may require a certain level of political openness, economic entrepreneurship, and flexibility of civil-military institutions (Van Evera 1990–91; Biddle and Zirkle 1996).⁵⁷ Moreover, the incorporation of new technologies into existing military systems and strategic doctrines is generally not sufficient for success. The advantage often comes to those who create new operational units that integrate new technologies with other systems in innovative ways; this can occur in a variety of political systems. The creation of the Panzer division and the blitzkrieg and the advantages that they gave to Germany in 1939–40, for example, were more organizational and conceptual than material. Needless to say, such developments are difficult to predict. This uncertainty reinforces the idea that there exist many paths for information-based military innovation and that the result may be specialized competitions and possible breakthroughs in specific areas (Krepinevich 1994, 38).⁵⁸

One important implication is that this military revolution, if it continues, could create the conditions that are conducive to the rapid rise of new military powers (Cohen 1996, 51).⁵⁹ This could bring challenges to the existing order and, judging from the past, increase the probability of war. There is growing evidence that power transitions, and even power shifts resulting in rapid approaches that fall short of complete transitions, are enormously destabilizing in international politics (Gilpin 1981; Kugler and Lemke 1996; DiCicco and Levy 1999). Although incentives for preventive war against rapidly rising powers are considerably dampened by the destructive power of nuclear weapons, such a response to power shifts remains a concern. At a minimum

we can predict new crises arising from power shifts in the future, whatever their origin.

There is also the question of crisis stability after the information revolution, both at the strategic nuclear level and the "sophisticated conventional" level (Bonen and Cohen 1996). The latter is probably the most problematic. If we are moving in the direction of "systems of systems," how secure will they be against a disabling first blow? To what extent does the advantage go to the offense, to the side that strikes first? Another issue concerns information warfare against the adversary's information and communications systems, either as a precursor to war or as part of a strategy of coercive bargaining. Although the risk of escalation to the nuclear level deterred conventional wars and reinforced crisis stability during the nuclear age, there is no guarantee that the risks of escalation will have a comparable deterrent effect against information warfare, particularly if such "warfare" takes the form of nonviolent sabotage of the adversary's information systems.⁶⁰ It is conceivable that political leaders and their publics could put nonviolent information warfare in a different category than the violent destruction of material and human resources so that the former becomes "decoupled" from higher levels of escalation. This could lower the perceived risks of information warfare and increase its probability, in a modified version of Glenn Snyder's (1965) stability-instability paradox.⁶¹

All of this is not to suggest, however, that technological change is the most important factor driving the evolution of war or that the most likely form of international conflict in the future will involve sophisticated conventional warfare by technologically advanced states or the consequence of an impending or actual power transition by a new military power. Quite to the contrary, the key variables may be political, social, cultural, and perhaps economic. The most common form of conflict in the intermediate future is likely to be civil wars within states and low-intensity conflict across state boundaries, in which communal groups and other organized nonstate actors will play an increasingly central role (Van Creveld 1991; Holsti 1996). In this sense Van Creveld is correct about the "transformation of war" and the increasing irrelevance of the Clausewitzian focus on states and their organized armies for many forms of warfare.

Van Creveld (1991, 193) goes too far, however, in suggesting that because of nuclear weapons (advanced) states are decreasingly able to fight each other, that as a result the state is "on its way to oblivion" as a political entity, and that conventional interstate wars are a thing of the past. The Iraqi invasion of Kuwait and its escalation to a general regional war led by great power intervention, which occurred just before the publication of Van Creveld's *The Transformation of War* (1991), was a timely reminder that he had overstated his case. Ongoing tensions in the Middle East, the Balkans, the Korean peninsula, the horn of Africa, the Taiwan straits, and the Indian subcontinent are all indicators that the

possibility of war between states and of the possible intervention of global powers in regional wars has not ended with the development of nuclear weapons, the end of the Cold War, or the increasing importance of nonstate actors.

What is the relationship between past trends and current trends? This discussion has explained changes in warfare, and particularly the increasing severity of war, in terms of a number of factors at the systemic, bureaucratic-organizational, and societal levels: changes in military technology, the rationalization and centralization of military power under the state, the commercialization of war, the popularization of war, the professionalization of military power, and the totalization of war. We have argued that technological change, which contributed significantly to the increasing destructiveness of weapons systems and consequently to the increasing severity of war in the past, may now be having the opposite effect, although it is too early to tell whether this will be the case or how long it will last. It is also possible that the other factors that have contributed to the increasing severity of war in the past may now be shaping the future of war in different ways.

We have emphasized that the rationalization of military power under the state, and the concomitant shift in the issues over which wars were fought from personal honor and dynastic ambition to state security and wealth, had much to do with the increasing severity of armed conflict in early modern Europe. New developments suggest a reversal of this trend, with a shift in the interests for which some wars are fought away from the state and toward communal groups and other nonstate actors. Although this may increase the frequency of organized violence and where it occurs, it is not yet clear how it will affect the overall severity of armed conflict.

The rationalization of power under the state is related to the centralization of political power in state institutions, and the increase in the latter over the last five centuries has continued to contribute to the increasing severity of military conflict. Although the preeminence of the state is almost universally recognized in the developed world, there are many parts of the developing world that are characterized by a crisis of governance, a disintegration of political authority, and a decentralization of political power, a phenomenon captured by the concept of "collapsed states" (Zartman 1995; Kaplan 1994). This trend away from the centralization of power in the state in parts of the world has contributed to the increase in the outbreak of internal war and in some cases to the internationalization of internal conflict.

The symbiotic relationship between war and commerce that characterized mercantilist thought and interstate behavior in the seventeenth and eighteenth centuries contributed to both the frequency and seriousness of great power war in that era, and commercial rivalries often escalated to strategic rivalries and to war (Levy and Ali 1998). With the rise of a liberal world economy and liberal economic ideology, the link between commercial rivalries and war is much

weaker, as assumptions regarding the zero-sum nature of economic wealth in the global system have declined significantly.⁶² Moreover, with the development of nuclear weapons any uncertainties regarding the substantial economic costs of war have been greatly reduced, and given the risks of escalation it is hard to imagine the conditions under which an advanced industrial state could conclude that the use of military force against another advanced industrial state would serve its economic interests. In the developing world, however, the use of military threats and force may still be perceived to be a viable instrument of state policy for the advancement of state economic interests, as the Iraqi invasion of Kuwait in 1990 suggests (Freedman and Karsh 1993).

The popularization of warfare that emerged at the beginning of the nineteenth century may continue to be an important source of future conflict in both the developed and developing worlds. Although the absence of war between stable democracies is quite striking, popular passions in nondemocratic states, in states undergoing a transition in regime type, and even in recently formed democratic states in search of legitimacy can still create domestic political incentives for political leaders to use external force for diversionary purposes. Ethnic rivals make particularly useful targets for external scapegoating, as recent experiences in the former Yugoslavia and in central Africa demonstrate. The future extent of conflict in many parts of the world will depend a great deal on whether the interdemocratic peace can withstand the forces that are generating and exploiting identity-based conflicts.

Notes

We have benefited from helpful comments on this manuscript by Edward Rhodes and David Dellinger.

1. The transition from the fifteenth to the sixteenth century marked the end of the Middle Ages and the beginning of the modern era. The new international system was characterized by an interdependent system of territorial states that interacted with each other on a regular basis and whose leaders perceived that what occurred in one part of the system could significantly affect their own interests (Levy 1983, chap. 2). This time also marked the beginnings of a truly global system of security relations and a global political economy (Thompson 1988; Wallerstein 1984), as well as a revolution in military affairs that had a profound impact on the conduct of warfare and on the development of the state (Roberts 1955; Tilly 1975, 1990).
2. Although there is some evidence of cyclical trends in the magnitude (or seriousness) of war, there is considerable debate about the existence of cyclical trends in the frequency of war (Sorokin 1937; Singer and Cusack 1981; Thompson 1988; Goldstein 1988).
3. This builds on Bull (1977, 184), Levy (1983, 51–53), and Vasquez (1993, 21–29).

4. The data set from the Stockholm International Peace Research Institute (SIPRI) and the Department of Peace and Conflict Research at Uppsala University includes many low-intensity conflicts that are excluded from the Singer and Small data set. This complicates the task of making comparisons but is necessary given the increasing importance of low-intensity wars. The growth of low-intensity wars, along with that of ethnic, religious, and other kinds of identity wars, raises difficult questions about the utility of the traditional conceptualization of war as organized violence between the organized military forces of territorial states, which goes back to Clausewitz (1832) 1976). The new warfare also raises questions about the validity of the analytic distinction between interstate and intrastate warfare. This has led to the development of new data sets that are arguably more useful for the analysis of contemporary warfare. See, for example, Gurr (1993) and Marshall (1999). Singer and his colleagues are also developing a new data set that includes low-level conflicts and nonstate actors (Wayman, Sarkees, and Singer 1997).
5. For the definition and identification of the great powers, see Levy (1983, chap. 2), as modified by Levy, Morgan, and Judd (1990). The main change is the ending of Spain's status as a great power in 1659 and the beginning of Japan's great power role in 1902.
6. See also Ranke ([1833] 1973) and Waltz (1979, 72–73).
7. Admittedly, both the Singer and Small (1982) list of extrasystemic wars and the Wright (1965) list of European wars may involve some degree of selection bias in favor of wars that involve the great powers.
8. This does not necessarily apply to internal conflicts, some of which (such as the Taiping Rebellion, 1860–64) have been enormously destructive for minor powers.
9. The number of great powers in the system has varied from four to eight. Although the number of great powers peaked in the first half of the twentieth century, there has been no significant upward trend in the number of great powers in the system over the last five centuries (Levy 1983), and consequently we have not controlled for this variable in our analysis.
10. This analysis is somewhat sensitive to the criteria by which simultaneous wars are aggregated into a single war or disaggregated into separate wars. We follow Levy (1983) and disaggregate the Thirty Years' War into four distinct phases, separate the French Revolutionary Wars and the Napoleonic Wars, and include the Pacific War (1941–45) as part of World War II. For our list of great power wars in the twentieth century, we exclude the Western intervention in the Russia Civil War and the limited Russo-Japanese military confrontation in Changkufeng in 1938 but include the more substantial Russo-Japanese War in 1939 (the Nomonhan War, which resulted in 15,000 Japanese deaths) and the Korean War (based on our decision to treat China as a great power beginning in 1949). These codings are consistent with Singer and Small (1972) and Levy (1983). Slightly different coding rules would result in the exclusion of all four (rather than two) of these cases and result in a monotonic decline in the frequency of great power war over the last five centuries.
11. Levy (1991, 147) calculated that the probability of there being a forty-five-year period without a war between two great powers, given the experience of the last five

centuries, was about .005. This was based on the application of a Poisson model to the Levy (1983) data and on the exclusion of the Korean War as a marginal case.

12. This follows Singer and Small (1972) and Richardson (1960). The measure of the severity or destructiveness of war is admittedly problematic, even controlling for the increase in population size over time (see n. 13). Battle-related deaths only partially capture the human or societal impact of war. This is particularly true for the earlier years of the system, when disease and exposure on the campaign, quite apart from battles, accounted for a significant proportion of the casualties of war. Wars that result in the destruction of food and medical supplies, shelter, and sanitation systems generate deaths that are not captured by statistics on battle deaths. The devastating impact of the Thirty Years' War on European society, for example, involved far more than the unprecedented levels of battle deaths (Parker 1984). By focusing on the period since 1815 Singer and his colleagues were able to minimize many of these problems, but analytical difficulties remain. In the American Indian wars, for example, deaths from battle were generally small, but a tribe could be devastated by a winter cavalry raid that destroyed food stocks and shelter. There are also enormous problems involved in conceptualizing severity in recent "identity wars" (Licklider 1995), where the ratio of civilian and noncombatant deaths to battle-related fatalities—generally increasing over time (Eckhardt 1992)—is quite high. In the absence of systematic data on alternative indicators of the human destructiveness of war, however, we will continue to use the conventional battle-death indicator, recognizing that this indicator does not fully capture the many dimensions of the impact of warfare on society and how that impact has changed over time. (The authors are grateful to Edward Rhodes for reminding us of these problems.)
13. By looking at the ratio of battle deaths to population (Levy [1983] uses European population as a baseline), or intensity of war, to control for the increase in population over time, we find that the intensity of war has increased, although not quite as rapidly, doubling once every 150 years. The concentration of war, or the ratio of battle deaths to nation-months of war, has also been increasing, doubling every 100 years.
14. In terms of the diplomatic and political impact of the war on the international system, the number of great power participants in a war may be one of the most important indicators, but it is not included in the COW data set.
15. Note that from 1519 to 1556 the Spanish Habsburgs and the Austrian Habsburgs were united under the rule of Charles V and treated as a single great power for the purposes of analysis.
16. This is true even if we control for the number of great powers in the system.
17. Levy's (1982, 290) regression analysis gives a τ_0 of .02 and an unstandardized b of 2,002.
18. Here we follow Levy (1983, 81–82) and define duration in terms of the elapsed time from initiation to termination, in contrast to Singer and Small (1972), who subtract extensive interruptions in fighting from their duration measure for the period since 1815. The elapsed-time indicator avoids problems in the measurement of temporary

interruptions in war, which are especially troublesome for wars in the first two centuries of the modern system and for the continuous warfare of the Ottoman Empire, but it exaggerates the true duration of some of these wars and consequently exaggerates the degree of decline (or understates the degree of increase) in the duration of war over time.

19. The other was the War of Dutch Independence/Spanish Armada (1585–1604). The magnitudes of the two world wars of the twentieth century were limited by their modest duration. Nation-years is the sum of the number of years of war for each of the participating great powers.
20. General wars include the War of Dutch Independence/Spanish Armada (1585–1609), the Thirty Years' War (1618–48), the Dutch War of Louis XIV (1672–78), the War of the League of Augsburg (1688–97), the War of the Spanish Succession (1701–13), the War of Jenkins' Ear/Austrian Succession (1739–48), the Seven Years' War (1755–63), the French Revolutionary and Napoleonic Wars (1792–1815), World War I (1914–18), and World War II (1939–45). Other scholars use the labels *systemic wars* (Midlarsky 1988), *global wars* (Thompson 1988), or *hegemonic wars* (Gilpin 1981) and vary slightly in the identification of which wars qualify. Thompson (1988), who identifies a set of five periods of global war that have begun approximately once every one hundred years, argues that global war has been cyclical with periods of varying length.
21. If we look at all interstate wars involving the great powers, rather than only at wars between the great powers (i.e., the combination of major major and major-minor wars rather than just major-major wars), the picture is slightly different (Levy 1983, chap. 6). The frequency of these wars as a whole has diminished over time, although not quite as rapidly as that of major-major wars alone. The duration of interstate wars involving great powers has also declined somewhat over time, due in part to the influence of some rather lengthy major-minor wars between the Ottoman Empire and other states. The number of great powers involved in each war has on average remained about the same, which in conjunction with the constant extent in war results in a slight historical decline in the magnitude of interstate wars involving the great powers. In terms of the severity of war we find, not surprisingly, that the number of battle deaths from interstate wars involving the great powers has been increasing over time, with a particularly strong tendency for the most severe wars of any period to become increasingly severe in terms of the loss of life.
22. It is more difficult to establish trends in the frequency of civil wars or imperial wars over the entire period because the coding rules underlying Wright's (1965) data for these wars are rather suspect (Levy 1983, chap. 3). For the sixteenth through the nineteenth centuries, however, Wright's (1965) data suggest that the frequency of civil wars has been roughly constant over the this period except for a noticeable decline in the eighteenth century. Wright's data on imperial wars show only a hand-prisingly, a sharp increase in the nineteenth century.
23. Interstate war is any armed conflict between system members that involves at least one thousand battle deaths among the system members, which are those states that

have populations of at least 500,000 or that have diplomatic recognition from Britain or France (the system "legitimizers") or membership in an international organization. Extrasystemic wars are those fought between a system member and a nonmember of the system and that involve at least one thousand battle deaths by system members. Civil wars retain the battle-death threshold of one thousand but include civilian as well as military deaths, given the difficulty of distinguishing between the two. The data used in figure 2 is from Singer and Small (1972) and Small and Singer (1982), updated through 1993, and SIPRI/Uppsala for 1994–95. Because we aggregated the data by decade beginning from 1815, we end in the year 1995 rather than 2000.

24. The number of states in the system has increased from about fifty in the mid-nineteenth century to over two hundred today.
25. Here we operationalize severity as the ratio of the number of battle-connected deaths to world population. This differs from Singer and Small (1972), who use this ratio as one of three measures of the *intensity* of war.
26. World War I overlaps into two of the ten-year periods included in this analysis. Given that the unit of analysis in the collection of battle-death data is the war, not the year, in cases of wars overlapping the ten-year periods of aggregation we distribute the battle deaths proportionately with the amount of time in each period.
27. This conclusion may be somewhat sensitive to the particular coding rules that Small and Singer (1982) employ, particularly as regards their conception of system membership. Their operationalization in terms of membership in an international organization or diplomatic recognition from Britain or France clearly reflects a Western bias, one that was particularly strong prior to the expansion of international organizations in the mid-twentieth century. This criterion undoubtedly results in an underestimation of the number of interstate wars and civil wars, as some extrasystemic wars should probably be counted as interstate wars and additional civil wars should be included. There may also be a significant underestimation of the number of fatalities from extrasystemic wars because fatalities for nonsystem members are not included in the total. This is particularly important in the measurement of the severity of extrasystemic war in the second half of the nineteenth century and early twentieth century, the peak of European expansionism; the excluded fatalities are generally far greater than those of the Europeans because of the latter's technological and organizational superiority.
28. Our data sources on the severity of war include the COW data up through 1988 and the SIPRI data from 1989 to 1995. These data sources use different coding rules and are not perfectly compatible. One problem is that the COW data on battle-related deaths focuses on fatalities from wars, whereas the SIPRI data includes deaths from all armed conflicts, not just wars. One consequence of eliminating fatalities from armed conflicts that do not satisfy the Singer and Small criteria for wars is that our fatality figures are lower than those of Wallensteen and Sollenberg (1996), for example, which reports more than seventy thousand battle deaths in 1992, whereas we report fifty thousand.
29. Other analyses of recent trends in war (Marshall 1999; Wallensteen and Sollenberg 1999; Wayman, Sarkees, and Singer 1997) generate similar results.

30. The impression of an increase in civil and ethnonational wars derives in part from their salience. These wars have occurred at a time when the great powers have been at peace with each other and in places that had previously been relatively peaceful. The new media are also much more likely to report violent conflict and its human costs. Note, however, that, after a decline in the frequency of armed conflicts since 1992, there was a sharp increase in 1998 (Wallensteen and Sollenberg 1999).
31. The argument that the benefits of conquest have diminished over time is disputed by Liberman (1996).
32. We have included ideational as well as material variables in our discussion of the costs and benefits of war. Whether international institutions affect the frequency and seriousness of great power war is a matter of heated debate (Mearsheimer 1994–95; Keohane and Martin 1995; Betts 1992; Kupchan and Kupchan 1995).
33. Note that the interdependencies of states with respect to security and with respect to economics are not necessarily colinear.
34. This suggests that change in warfare might fit a model of "punctuated equilibrium," whereby intense periods of revolutionary change are separated by extended periods of stable equilibrium in which change is slow (Rogers 1993).
35. The growing literature on military revolutions includes empirical analyses of whether a military revolution is currently underway, normative analyses of whether the United States ought to help promote a military revolution, and examinations of military revolutions in history—and in early modern Europe in particular (Krepinevich 1994; Cohen 1996; Nye and Owens 1996; Biddle 1998; O'Hanlon 2000; Roberts 1995; Parker 1988; Rogers 1995). Krepinevich (1994, 30) defines a military revolution as "the application of new technologies into a significant number of military systems with innovative operational concepts and organizational adaptation in a way that fundamentally alters the character and conduct of conflict." This falls somewhere between a military technical revolution (MTR) and a revolution in military affairs (RMA). Not all MTRs trigger RMAs, as Lynn's (1996b) work on technological change and the French army in the late seventeenth century shows so well, and not all RMAs are triggered by MTRs, as demonstrated by the Napoleonic revolution in warfare, which was more conceptual and doctrinal than technological. See Sullivan (1996) on the distinction between MTRs and RMAs.
36. An earlier MTR that had important consequences for the conduct of warfare was the development of the longbow in the fourteenth century. By increasing the ability of archers to penetrate the armor of cavalrmen, the longbow, along with associated tactical innovations, contributed to a sharp increase in casualties on the battlefield and to the displacement of previously dominant heavy cavalry by infantry. Some refer to this as the "Infantry Revolution" (Rogers 1993).
37. With the replacement of the block by the line, one rank could fire while the other reloaded. This was important because individual muskets were not very accurate. Their impact came in combination and in their effect in breaking up military formations, which left individual soldiers vulnerable to pike and bayonet. This placed greater emphasis on unit cohesion, which was a product of organizational, political,

- and societal variables. This is just one example of how the primary effects of military technology often come through its interaction effects with other variables.
38. There was also a profound military technical revolution at sea in the early sixteenth century, as light oar-powered galleys, which could not carry the large cannon that emerged from the artillery revolution, gave way to sailing ships. This "Revolution of Sail and Shot" (Krepinevich 1994, 32-33) was conclusively demonstrated by the defeat of Turkish galleys at the Battle of Lepanto (1571). This symbolized the beginning of a radically new era of naval warfare and contributed significantly to the ability of the European great powers to project their power and to the expansion of commerce on a global scale. But this naval revolution did not by itself contribute to the increasing severity of war.
39. Although invented in the late eighteenth century, the steam engine did not have a significant impact on land warfare for nearly a century.
40. Nef (1950) suggests that another consequence of the industrial revolution was that the earlier moral and cultural restraints on war associated with the Christian and humanist traditions were gradually eroded by the materialism and individualism of industrial society.
41. The telegraph also had important implications for civil-military relations (Cohen 1996, 42).
42. Cohen (1996, 44) refers to this as the "firepower" revolution.
43. Lagging only slightly behind this revolution in land warfare was a revolution in naval warfare that began in the middle of the nineteenth century. The wooden sailing ships, powered by wind and armed with short range cannon, which had dominated war at sea since the revolution of sail and shot in the sixteenth century, gave way to metal-hulled ships powered by turbine engines and armed with long-range rifled artillery. The result was a fundamental change in the nature of naval warfare, led by France but soon followed by Britain and then Germany (Brodie 1941; Krepinevich 1994, 35-36). This revolution in the technology of the surface fleet was soon followed by the introduction of the submarine and the torpedo, which further changed the nature of naval warfare through the use of the submarine in strategic blockade and commerce raiding. The effects of these fundamental changes in military technology on warfare on both land and sea was evident in the conduct of World War I, although as before the direct impact of naval revolutions on the overall number of casualties from war was limited.
44. This occurrence highlights the analytic problem of whether simultaneous developments in military technology in different areas, or sequential developments in the same area, should be treated as a single revolution or as a set of distinct revolutions.
45. Mueller (1995) argues that conventional warfare had become so destructive that war between major powers was becoming obsolete even in the absence of nuclear weapons.
46. This raises the question of how to assess the relative weight of technological and sociopolitical factors, which is a central issue in the debate regarding the military revolution of the sixteenth and seventeenth centuries (Roberts 1955; Parker 1988; Rogers 1995; Tilly 1975; Howard 1976; Black 1991; Lynn 1996b). It may be that the interaction effects among these variables are greater than their direct effects.

47. The emergence of small arms and artillery also helped to undermine the knight by ending the reign of prowess as a military virtue. Superior strength, courage, and skill were no longer guarantees of heroic triumph on the battlefield (Roland 1996).
48. The development of artillery created economies of scale that effectively priced nobles out of the market (Porter 1994, 31-32). The same is true for the *trace italienne*, which was too expensive for individual nobles to employ. The cost of the new fortifications was even greater than some Italian city-states could afford. Siena spent so much on fortifications in 1553 that it ran out of funds to raise troops to man the walls the following year (Parker 1988, 12).
49. The establishment of permanent, and larger, armies was necessary to absorb larger casualties, to enhance the efficiency of military operations, and to avoid the inefficiencies of demobilization following the end of a campaign.
50. Exactly how states dealt with their fiscal crises had a significant impact on state formation and prospects for democracy. North and Weingast (1989) discuss Britain in this light. Anderson (1974) notes that in the east the Swedish invasion of Germany in the Thirty Years' War led elites to re-empower the peasants in an attempt to increase revenues, a process that resembles Tilly's (1990) coercive-intensive path of state formation.
51. The influence of private interests on state policy varied across states as a function of the degree of centralization of state power and the degree of concentration of parochial interests. The increasing assertiveness of the English Parliament under the Commonwealth in the mid-seventeenth century, for example, gave actors with concentrated interests in certain sectors greater influence on state policy in England (or in the Netherlands) than in France (Martin 1997). On the influence of merchants on foreign policy in the Dutch Republic and in England see Wilson (1978) and Levy and Ali (1998).
52. As Buzan (1987, 18) notes, Napoleon's victories were based "almost wholly on the innovative use of existing types of weapons, and scarcely at all on innovations in the weapons themselves."
53. We prefer the concept of the popularization of war to the democratization of war (Millis 1956, chap. 1). The latter carries more conceptual baggage, whereas the former is less restrictive as to the types of regimes in which this phenomenon could occur.
54. Millis (1956) gives primary emphasis to material factors and calls this the "scientific revolution" in warfare. In our view that is misleading because it underestimates the autonomous impact of political, social, and ideational factors.
55. Some of the potential military consequences of this "information revolution" were anticipated in its early stages by the Soviet military in the 1970s. This potential was demonstrated most forcefully by the United States in the 1990-91 Persian Gulf War. For critical assessments of the hypothesized revolution in military affairs, see Bidle (1988) and O'Hanlon (2000).
56. The rate of diffusion of military inventions appears to be increasing over time (Krepinevich 1994, 37), and this is particularly likely for civilian-based information systems in an era of the rapid globalization of an open world economy.

57. Given the relationship between economic strength and the ability to develop and apply information technologies, it is interesting to hypothesize that the link between economic strength and military power—which was weakened somewhat by the nuclear revolution—may once again be reinforced.
58. This creates a security dilemma in information-based military systems. States may push for a military technical revolution primarily out of a fear of the consequences should an adversary be the first to make a breakthrough in an important area.
59. The rise of new military powers could also occur through the proliferation of nuclear weapons.
60. This raises another set of difficult conceptual issues regarding what one means by war. Standard definitions of war—which require organized armed violence involving a minimum threshold of battle fatalities (Singer and Small 1972; Vasquez 1993)—may not fully capture the various ways in which states might attempt to incapacitate the military systems of their adversaries in the future.
61. Snyder (1965) argues that stability at the nuclear level could generate instability at the conventional level by increasing confidence that conventional wars would not escalate to the nuclear level.
62. Although there is some evidence that economic interdependence tends to reduce the level of militarized interstate conflict (Oneal and Russett 1997), this argument has been challenged (Barbieri 1996). High levels of economic interdependence did not prevent World War I, autarkic economic policies in the 1930s did contain a zero-sum element, and some have expressed concerns that the diffusion of ideas linked to strategic trade could lead to a resurgence of mercantilist ideology and a reorientation of the world economy away from free trade and toward a more conflictual system of trading blocs (Weber and Zysman 1992).

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