Modern War

The Rise of the Modern World System

Modernization is best conceived not only as an intra-social process of economic development, but also as a world-historic inter-societal phenomenon.
—Theda Skocpol (1983, p. 70; emphasis in original)

Modern war, marked by the incorporation of industrial and scientific techniques, dominated by the logic of total war, and structured by very specific definitions of logic and rationality, coevolved with modernism. Modernism is a world system. It is a system of hegemony—militarily, economically, and politically for those countries with Western-style economies. To say “Western” is not to pretend that there is one West, the Occident, but rather to notice that there is a Western viewpoint that is hegemonic, not only in terms of the rest of the world but even in relationship to different discourses within Europe and the “neo-Europes.” Even as modernism has been produced through many different models of industrialization for the rest of the world (variously mixes of capitalist, communist, fascist, social democratic, liberal, conservative), the decisive element for most countries is their role as either colonies or neocolonies of the industrialized countries.

And what is the basis for this success? In a word, technoscience. First the technosciences of war and then the technosciences of industrialization. This expanding hegemony is detailed in three remarkable books: Geoffrey Parker’s *The Military Revolution: Military Innovation and the Rise of the West, 1500–1800* (1988); Daniel Headrick’s *The Tools of Empire: Technology and European Imperialism in the Nineteenth Century* (1981); and Kurt Mendelsohn’s *The Secret of Western Domination: How Science Became the Key to Global Power, and What It Signifies for the Rest of the World* (1976). Together, they give a clear and comprehensive explanation of the victory of European colonialism that established the modern state system.
Parker's book concentrates on the first 300 years of modern war, during which European states came to control 35 percent of the world's land surface. Headrick's describes how in the 114 years between 1800 and 1914 that domination went up to 84 percent (Parker, 1988, p. 5).

It is no coincidence that the development of modern war coincided with the modern state system. The military innovations that mark modern war have proven crucial in maintaining Western military superiority around the world to this day. In the sixteenth and seventeenth centuries it was cannons on ships and firearms in general. In the eighteenth and nineteenth centuries artillery and repeating guns of various types became central. In the twentieth century armor, airpower, and superweapons have been the clear margin of victory up until the French defeat at Dienbienphu in 1954. In all these eras industrial power, translated directly into large-scale manufacturing of weapons, has been the central organizing principle of the modern war system.

Much of modern war is a story of the Spanish blunderbuss against the clubs and spears of the Aztecs and Incas, British matchlocks against the swords and pikes of the Hindus, Royal Navy men-of-war versus Chinese junks and Arab dhows, U.S. Cavalry repeating rifles against Sioux and Arapaho, and machine guns by Gatling and Maxim—Vickers against Arab dervishes, Chinese Boxers, Mescalero Apaches, and massed Zulu spearmen.

Shrapnel was first used in Surinam, the percussion musket in China, and the minie ball in southern Africa. The dumdum bullet, for example, which expands on contact, tearing jagged holes in its victims, was outlawed by the 1868 St. Petersberg Declaration when all such exploding bullets were forbidden. However, the British said it didn't apply to dumdums because the bullets, made at the Dum Dum Arsenal, near Calcutta, India, were only used on natives. Surgeon Maj. Gen. J. B. Hamilton and Sir John Ardagh explained, "Civilized man is much more susceptible to injury than savages... The savage, like the tiger, is not so impressionable, and will go on fighting even when desperately wounded" (R. O'Connell, 1989, p. 242).

The story of modern war is also a tale of the decline of moderation in war until it "perished in the fireball above Hiroshima," as Michael Glover puts it in his The Velvet Glove: The Decline and Fall of Moderation in War (1982, p. 15). Ironically enough, that very fireball marked the end, as well as the apotheosis, of total war. Limited war has returned to central stage since 1945, although moderation certainly has not.

Modern war was also a prime shaper of modern politics, but not just in the obvious ways through military coups, military policy, and militarism in industry and education. Military metaphors, values, and concepts also intimately shaped most modern revolutions from 1789 to 1968 (Virilio, 1986). Through practice and birth, most modern states were modern war states.

Along with technoscience and modern state politics, the other crucial aspect of modern war was economics. For hundreds of years the importance of industrial power and infrastructure in producing military power was clear
to military men and politicians alike. Railroads, the American system of manufacturing, steel production, and many other key facets of the modern economy have been directly traced to military demands (M. R. Smith, 1985b). Recently, this relationship between economic strength and military power has become even clearer. Paul Kennedy’s history of the modern empires, *The Rise and Fall of the Great Powers* (1987), shows that, at least in modern times, there has been a very direct relationship between the economic power of the dominant Western countries and their military power. While fluctuations occur, the two measures have never drifted very far from each other. Even nineteenth-century Prussia, that “army with a state,” could only grow as powerful as its economy.

In the Middle Ages, European war was dominated by aristocrats, although peasants did most of the dying. But in the 1500s three important trends developed that mark the beginning of modern war:

1. Applying rationality to war instead of tradition
2. The development of administrative bureaucracies
3. The systematic application of science and technology

A number of historians have called Niccolò Machiavelli the first theorist of modern war and for good reason. At a time when war in Italy was often an almost bloodless ritual, orchestrated by tradition and performed by professionals, he advocated conscripting armies to fight bloody, decisive battles. For most intellectuals of his time war was beneath serious theoretical or practical consideration, and it was deemed of only minor political importance. But Machiavelli argued that war was an intimate part of civil life. In his introduction to his book, *The Art of War* (1990), he links the two in a formula that hundreds of years later Clausewitz could well accept:

Many are now of the opinion that no two things are more discordant and incongruous than a civil and military life. But if we consider the nature of government, we shall find a very strict and intimate relation betwixt these two conditions; and that they are not only compatible and consistent with each other, but necessarily connected and united together. (quoted in Gilbert, 1943, p. 3)

While Machiavelli advocated conscription of free citizens with a stake in the war, it would be almost 300 years (1789) before such mass national armies would became dominant. Still, the expansion of the money economy in the sixteenth century led to the eclipse of the agricultural-feudal foundations of war in the Middle Ages. This opened the way for the city merchants and wealthy overlords to replace feudal military obligations with purchased professional soldiers, laying the foundations for permanent mass armies.

Machiavelli was especially perceptive in noting the return of total war
aimed at the complete subjugation of the enemy. As he said of the skirmishing and negotiations of the small professional armies of Italy in the early 1500s: "That cannot be called war where men do not kill each other, cities are not sacked, nor territories laid waste" (pp. 13-14).

Perhaps most significantly, the historian Felix Gilbert points out, Machiavelli took advantage of the "political events of his time... the intellectual achievements of the Renaissance... the military innovations of the period" (the rise of infantry, new weapons), and the "crisis of political institutions and values which signified the end of the Middle Ages" to make a "radical reexamination" of military and political assumptions.

His first new assumption, to quote Gilbert, was that there were laws which reason could discover and through which events could be controlled. The view that laws ruled also over military events and determined them in their course was a fundamental assumption of Machiavelli's concern about military affairs; his military interests centered in the search for these laws. Thus he shared the belief of the Renaissance in man's reason and its optimism that, by the weapon of reason, man was able to conquer and destroy the realm of chance and luck in life. . . . When Machiavelli set the battle into the center of his military theories, he could do so because the uncertainty of the outcome which previous writers had feared did not terrify him; by forming a military organization in accordance with the laws which reason prescribed for it, it would be possible to reduce the influence of chance and to make sure of success. (p. 3)

Success is never sure in war. But along with Machiavelli, men began to believe that through reason one could almost be sure. An important part of this reasoning was the great improvement in the infrastructure of war: the bureaucracies and economies that raised and maintained the armies.

Michael Wolf (1969, p. 41) notes "the most important development in the organization of western European military power was the rise of the ministries of war and marine as bureaucratic organizations responsible for the conduct of warfare." Rupert Hall also emphasizes the importance of organization at the expense of scientific developments in the sixteenth and seventeenth centuries:

Throughout the period with which I am concerned today military affairs were determined by three things: organizing ability, including what we today call logistics; basic craft skill; and courage. . . . They no more depended on scientific knowledge than they did on the relative size of the combatants' populations or their real economic strength. (1969, p. 4)

But Hall and Wolf are drawing hard lines between crafts and science and logistical bureaucracies and industry where none really appear. Science
was nurtured by many forces, among the most important are the ones Hall emphasizes. In turn, science changed the crafts, the bureaucracies, and logistics. Besides the general matrix these social forces shared, the men of the new philosophy, now known as science, made many direct contributions to the changes in war that marked the birth of the modern age. Hall himself points out many specific instances. For example, navigation and artillery were strongly improved by scientific discoveries and approaches (Hall, 1969, pp. 5-6), and both the Royal Society and the Académie des Sciences were interested in ways of testing gunpowder (p. 10). In terms of fortifications, geometry was crucial. Bonaiuto Lorini said it was “essential, the very foundation of all our procedures” (quoted on p. 12).

Perhaps the clearest case in this period of science influencing war is artillery. All the authoritative artillerists of the time claimed science was necessary for artillery, and all used mathematical tables, even though they were not empirically developed but based on various theories of ballistics that have since been discredited, such as proportional symmetry and strictly rectilinear segments. Galileo produced the first correct tables in his *Discourses on Two New Sciences*, in 1638. “This work on ballistics was developed further by Galileo’s pupil, Evangelista Torricelli, who generalized and completed the theory, after which it passed into general circulation” (pp. 20-21).

Wolf makes a similar point when he notes the improvements of cannon and mortars in the period 1670-1789 in terms of standardizing balls, reducing the charge of powder, better caissons, new types of harness, and better servicing equipment and procedures. All of these innovations were brought about by engineers and bureaucrats working for navy and war ministries. He also comments: “Perhaps of equal importance was the development of more effective weapons in the hands of the seventeenth century infantryman. By 1500-1550 firearms had completely displaced the cross- and longbows” (pp. 35–36). Over the next two hundred years there were many other improvements, including the fusil or flintlock, strap bayonets, better cartridges, and iron ramrods. These Wolf attributes to gunsmiths and sportsmen, not scientists.  

John Nef, on the other hand, argues clearly that “behind the development of artillery and small firearms at the end of the fifteenth century was [the] movement of scientific inquiry” (1963, p. 44). He also emphasizes that some of the earliest scientists were military men, who made their discoveries in battle. The leading engineer of his day, Pedro Navarro, who invented explosive mines and floating batteries, is a case in point. Nef concludes that

The instruments for inflicting pain and destruction were not prepared in laboratories as in our mechanical age; they were often improved with the enemy before the inventor’s eyes; the mingled physical horror and perverse pleasure entailed in their use was more obvious. (p. 44)
Still, individuals and their discoveries only played a part in the great social changes of the time. "The importance of gunpowder," explains Felix Gilbert, was only in the context of three more general developments:

first, the rise of the money economy; second, the attempts of the feudal overlord to free himself from dependence on his vassals and to establish a reliable foundation of power; and third, the trend toward experimentation in military organization resulting from the decline of feudalism. (1943, p. 6)

Over the next 300 years weapons continued to improve, the money economy to spread, experimentation in the military to increase, and the aristocracy to decline. The French Revolution dealt the final blow to the aristocratic hegemony in war. It is no accident that modern war was first labeled such then. Four years later the French Republic called for total war. Bernard Brodie quotes from a decree of the National Convention from 1793:

All Frenchmen are permanently requisitioned for service in the armies. The young men shall fight; the married men shall forge weapons and transport supplies; the women will make tents and clothes and serve in hospitals; the children will make up old linen into lint; the old men will have themselves carried into the public squares and rouse the courage of the fighting men, to preach hatred against kings and the unity of the Republic. (1973, p. 253)

Science was certainly mobilized at this point. The great mathematicians Gaspard Monge and Lazare Carnot, became, respectively, the ministers of Navy and War. According to John Nef:

Their application of the new geometrical knowledge to the actual conduct of war, together with their application of scientific knowledge generally to the problems of supplying adequate munitions, were factors of importance in the shift in Europe from wars of position to wars of movement. (1963, p. 320)

Nef notes a large number of important scientists were involved in war work, especially mathematicians. The efficiency of artillery, from manufacture to deployment, increased enormously. Their work also began to spread the idea that battles could be won "by calculations in the relative calm surrounding desks" through logistics and ingenuity, like a "game of chess." But, although, the "pawns were real men," the bureaucrats had growing difficulty in distinguishing "actual from toy soldiers" (p. 322)—a difficulty that has yet to be really overcome.

Between 1814 and the Crimean War there were no major European wars. Still, the weapons were improved. In 1827 the needle gun was invented. In
1829, cable/telegraph networks were established. In the 1840s rifled artillery was perfected. In 1848 the Prussians moved a complete army corps by train in an exercise. In 1850 Morse code was devised (Brodie, 1973, p. 12).

During The Crimean War, 1853–1856, torpedoes, trench war, the war telegraph, steam driven floating batteries, and females nurses were all introduced. The telegraph even allowed distant officials in London and Paris to interfere in tactical operations “hour by hour in order to save losses and political credibility” (p. 17). But it was in the United States that modern war first reached its full development.

The American Way of War

America is one of the most warlike nations on earth.
—Billy Mitchell (quoted in Franklin, 1988, p. 99)

Americans have always looked to science for their answers, in war as in everything else.
—Thomas and Barry (1991, p. 39)

Geoffrey Perrat, in his history of the United States, A Country Made by War, traces the growth of the twentieth century’s dominant world power in terms of the constant wars and militarizations that have made it possible. Now it is true that this image doesn’t fit the self-conception of the average U.S. citizen, but the history is clear. Just consider how much of U.S. territory was won through war or how many presidents were war heroes.

Of course, the very founding of the Republic was through war, and a very interesting war at that. It marked the first successful anti-colonial revolution, as well as the first victory of an unconventional people’s army over an established modern army. Is it any wonder that the British band played “The World Turned Upside Down” at their Yorktown surrender?

Most of the U.S. wars have been colonial. The most common were the hundreds of Indian battles and massacres whose end results were often genocidal, although in the early years the colonists were sometimes hard pressed (Steele, 1996). These wars were very important, despite their neglect by most military and social historians. In the Americas, in Africa, in Asia, and in Australia, the Europeans and the emigrant Europeans waged a long series of conflicts, often trying out new weapons and technologies.

In the United States advanced signaling, repeating rifles, and machine guns were all used extensively in various Indian wars. In most cases the strategy of total war was applied.

The Mexican–American War of 1846–1848 was a break from the Indian campaigns. The U.S. victory owed something to the growing industrial might
of the country, but even more it was due to the skilled professional army that stormed Mexico. It was a war of volley fire and sharp battles. It wasn't a grinding conflict of attrition pitting one country's industrial muscle and human blood against another. That kind of war was still a dozen years away.

It was the U.S. Civil War, often termed the first industrial war, that ushered in the last phase of modern war. The importance of that bloody conflict (notable for the introduction of the Gatling machine gun, the metal warship, and the use of railroads and telegraphs) cannot be overestimated.

Grady McWhiney and Perry Jamieson show in their book, *Attack and Die*, that the widespread adoption of the rifle in the 1850s made the aggressive frontal assaults that had won the Mexican War for the United States little more than mass suicide in the Civil War. The increased numbers and effectiveness of artillery didn't help matters either. Still, despite numerous mass slaughters of storming troops, very few Civil War commanders were able to adapt their tactics to the new realities of powerful rifles and massed artillery. The Union general Daniel Hill, who led his division in one of the many grandly heroic and bloody assaults, remembered later, "It was not war—it was murder" (quoted in McWhiney and Jamieson, 1982, p. 4).

One Civil War general who almost always avoided useless head-on assaults was William Tecumseh Sherman. He also played a central role in the spread of total war into the modern world. His famous March to the Sea was one of the first, and certainly the most famous, campaigns during a full Western war aimed directly at civilian morale and economic warmaking potential. Other U.S. generals (especially Ulysses S. Grant), and the Confederate cavalry raiders into the North (notably under Nathan B. Forrest, John H. Morgan, and William Quantrill), also practiced mass appropriations and other terror tactics, such as burning buildings from which shots had been fired. But Sherman made it the basis for a campaign and even allowed several whole towns to be destroyed by not tightly controlling his troops. He also, on at least one occasion, seized a whole factory full of textile workers and shipped over 400 of them to the North to make uniforms for the Union Army (Reston, 1984, p. 30).

James Reston, Jr., has written an insightful book, *Sherman's March and Vietnam*, that shows how Sherman's "counterinsurgency" policies led quite logically to the U.S. policy in Vietnam, which mirrored the Union approach during the Civil War (1984). Attrition, diplomacy, technology, and economic war (in that it aimed at economic power and civilian working morale) were the main pillars of the U.S. government's strategy in both cases. The difference was that the predominant Confederate strategy of aggressive main-force battles was quite unlike the "people's war" of the Vietnamese. The Vietnamese and the Confederates did share a realization that their best chance of victory was political, and it would increase as the conflict dragged on. The Confederates just couldn't last.

The United States's use of total war predates the Civil War by almost a
Reston argues. He notes that Sherman wrote about the rebellion of the Seminoles in language that mimics U.S. generals writing about the Vietnam War 120 years later (p. 90). The prolonged Seminole War in Florida was won in the only way the Vietnamese War could have been won—genocide. But Reston doesn’t put the Vietnam War into the context of the 200 years of extermination wars against the Indians that preceded the Seminole War, especially in New England by the English colonists and in the mid-Atlantic region by the Dutch and English.

Reston also discusses in detail Sherman’s later career as an Indian fighter. Before he took command of the war against the Indians in 1870 Sherman stated what his policy would be toward Indian resistance: “If I were in command, I would act with vindictive earnestness against the Sioux, even to the extermination of men, women, and children” (quoted in Reston, 1984, p. 90). Later, under his command, U.S. troops killed almost 200 Piegan Indians, a quarter of them women and children, while suffering only one casualty of their own. Even The New York Times termed it a massacre. Sherman defended the “battle” by referring to the shelling of Vicksburg and Atlanta, where women and children were also killed “out of military necessity.”

At the beginning of the twentieth century, this strong U.S. tradition of war became linked completely to the application of technoscience to battle. The Spanish–American War, in which the U.S. Navy destroyed the Spanish fleets with hardly a casualty, was one example of how potent this combination could be. Even more impressive, in retrospect, was the much more difficult and bloody conquest of the Philippines and the numerous successful invasions of Latin American countries by the U.S. Marines, who used machine guns, artillery, telegraphs, and even airplanes to gain an advantage.

Before the Civil War the technological requirements of civilians and soldiers were not that different. Even West Point was basically more of an engineering school than a military one. Science wasn’t really mobilized until World War I when the National Research Council was set up. Melvin Kranzberg points out that even though the National Academy of Sciences was created during the Civil War to help the military, in the first 50 years the War Department only asked for five studies.7

But in the realm of management, scientific and otherwise, and formal systems of manufacturing, the relationship between the U.S. military and the civilian sector was very strong, even intimate. The military itself is a formal system, although few call it logical. The rigid hierarchies in most armies, their insignias, uniforms, and the early historical codifications and written expert systems, as far back as Sun Tzu’s The Art of War, show the strong attraction between war and systematic rationality. The military has always had a burning desire for rules and orders, all the better to meet the unruliness and disorder of battle. Through history most armies have depended on automatic obedience (usually at the threat of instant death) from its soldiers. The men had to be parts that marched together, charged together,
fired together, and died together. When discipline failed and the formation was lost, defeat and massacre followed. But in the face of the growing technical aspects of battle, and to make possible continual innovation, traditional military discipline has become scientific and more businesslike. Leadership has become management.

There is strong evidence that the American system of management, and Fordism later, were both shaped by military managing innovations. Merritt Roe Smith summarizes some of this research and notes:

When one understands, for example, that Fordism traces its ancestry to the military arms industry of the nineteenth century, one begins to appreciate how deeply military-industrial rationality and centralization are implanted in American culture. The history of virtually every important metalworking industry in nineteenth-century America—machine tools, sewing machines, watches, typewriters, agricultural implements, bicycles, locomotives—reveals the pervasive influence of military management techniques. (1985a, p. 11)

Military and industrial management coevolved with the new technologies. Smith argues that “technological innovation entails managerial innovation” and therefore “technology and management are inextricably connected.” He goes on to claim that this substantiates Lewis Mumford’s view that the “army is in fact the ideal toward which a purely mechanical system of industry must tend” (Smith, pp. 10-11, quoting Mumford, 1934, p. 89). But it wasn’t until the eve of World War I that the relationship was formalized.

The U.S. Army’s official interest in the scientific management of itself can be traced back to 1909, when Frederick W. Taylor’s principles were initially applied at the Watertown Arsenal. Taylor’s development and codification of earlier military–industrial management techniques was a serious attempt to seize control of the shop floor from the workers. The weapons were time studies, standardizing machines, schedules, accounting and inventory controls, time-motion studies, and more workplace discipline.

Taylorism was met with a great deal of worker resistance, including bitter strikes in 1908 and 1911 at the Rock Island and Watertown Arsenals. But by 1918 one-third of the members of the Taylor Society were working in the Ordnance Department of the Army (Aitken, 1985). Worker’s strikes and anti-Taylor legislation from prolabor members of Congress were swept away by the U.S. entry into World War I. Militarization consolidated Taylorism in the arsenals and in many other industries.

Taylorism shows clearly the connection between military and industrial discipline and marks how the growth in the power of war managers has not only turned soldiers more and more into workers who produce death and
destruction but has also turned workers into industrial soldiers, producers of war matériel (men and machines).

David Noble's monumental history of industrial automation, *Forces of Production*, traces the history of scientific management, automated manufacturing and related systems through most of the twentieth century. He also describes the failure of this paradigm to successfully discipline the labor force any more than it rationalized the conditions of war:

"Taylor and his disciples tried to change the production process itself, in an effort to transfer skills from the hands of the machinist to the handbooks of management. Once this was done, they hoped, management would be in a position to prescribe the details of production tasks, through planning sheets and instruction cards, and thereafter simply supervise and discipline the humbled workers. It did not work out as well as they planned. No absolute science of metal cutting could be developed—there were simply too many stubborn variables to contend with. Methods engineers, time study men, and even the Army-trained Methods-Time-Measurement specialists who emerged during World War II, however much they changed the formal ways of doing things, never truly succeeded in wresting control over production from the work force." (1986b, p. 34)

There is "no absolute science" of war either, but it has been pursued none the less. The military's acceptance of scientific management spawned large-scale psychological testing of recruits for the first time, although it did nothing to lower the number of psychological casualties, which was its goal (Gabriel, 1987). The intelligence tests, on the other hand, produced interesting correlations and, in Merritt Roe Smith's words, "helped to stimulate general interest in the use of aptitude tests by managers as instruments for matching employee skills to the requirements of different jobs" (1985a, p. 14). What started as an attempt to weed out unfit soldiers became a tool for placing workers, which in turn the military adopted for assigning its own personnel.

By World War I the military and capitalist paradigms had become almost one and the same. American culture was militarized. In Kranzberg's view:

"The military... has become a major factor in our educational institutions and a prime force in industrial and economic life—and these largely because of the scientific and technological underpinnings of modern warfare..."

Indeed, all three elements of our concern—science, technology, and warfare—form an integral part of modern American civilization... The increasing importance of military institutions in modern American life thus depends in large part upon the fact that the military has become inextricably intertwined with science and technology. As these have become significant components of our national life and our national
security, the military too has gained a major role in American society. (1969, pp. 169–170)

Still, the full blossoming of modern total technological war did not take place until the first of this century's world wars, the "war to end all wars" in H. G. Wells mistaken epigram—named by the generation that survived it: the Great War.

**The Great War**

I don't know what is to be done, this isn't war.
—Field Marshal Lord Kitchener (quoted in Ekstein, 1989, p. 165)

How can the horror of the Great War be communicated? Poet-veterans, moviemakers, and historians have all tried. All wars have their horrible moments, but World War I seemed to mark a turning point. Any glory, any heroism, any individualism, any chance of the soldier controlling his own fate were stripped away. As many have said, men no longer made war, war was made on men, and the killing ground was called no-man's-land.

Modris Ekstein quotes a story from a British officer's diary to show what war had become. It seems that rotting German corpses were making the British trenches uninhabitable. So volunteers were sent out into no-man's-land to burn the bodies. As the officer puts it, "many gallant deeds are performed." One brave man in particular manages to burn three corpses before he is shot dead. The diarist comments, "cold blooded pluck." Ekstein asks, "How long would it be before men sensed the horrible ironies of a world in which gallantry was called upon to fight corpses, in which the living died trying to destroy the already dead?" (1989, p. 221, quoting the diary of Brigadier P. Mortimer).

But it wasn't just the erasure of courage by the incredibly powerful killing technologies that made the war so terrible. There were conscious decisions by both sides, starting with the Germans, to attack civilians. As they did in the Franco-Prussian War (and many colonial encounters), the Germans shelled civilian neighborhoods and executed hostages, including women, children, and the elderly, almost from the start. They burned the library at Louvain, which was over 500 years old and had a quarter of a million volumes, many irreplaceable. They bombed the cathedrals at Rheims, Albert, and Paris (pp. 156–157). Later in the war they launched unrestricted submarine warfare. The Allies soon responded with bombings and shellings of their own, but they refrained from taking or executing civilian hostages, not that some didn't advocate it. The Right Reverend A. F. Winnington-Ingram, Bishop of London, proclaimed, "Kill Germans! Kill them! . . . kill the good as well
Ekstein gives special credit to the Germans for accelerating the full flowering of total war. Its roots were in the total militarization of Germany, according to Ekstein, because for the Germans "all political questions, all economic questions, all cultural questions, were in the end military questions" (p. 146). Once the war stalemated, the strategy of bloody, industrial, attrition was followed. But its justification was almost unconscious, based as it was on the militarization of all problems.

Now, attrition was to be merely an offshoot of such thinking. It could not have grown had there not been a consistent buildup toward "totality." This called for the breakdown of the distinction between soldiers and civilians and the rejection of accepted morality in warfare. The treatment of civilians in Belgium by the occupying German forces and the reliance on new methods of warfare—especially the use of gas and inventions such as flamethrowers, and the introduction of unrestricted submarine warfare—were the most important steps, until attrition, in the advent of total war. (p. 147)

Along with this flowering of total war, Ekstein marks out several other crucial aspects of World War I. First in importance was its industrial, middle-class character. It was, he points out, "the first middle-class war in history":

It is therefore hardly surprising that the values of this middle class should have become the dominant values of the war, determining not only the behavior of individual soldiers but the whole organization and even strategy and tactics of the war. Its very extent—it was of course called the Great War—was a reflection of the nineteenth-century middle-class preoccupation with growth, gain, achievement, and size. Machines, empires, armies, bureaucracies, bridges, ships, all grew in size in the nineteenth century, this maximalist century; and dreadnought and Big Bertha were the telling names Europeans applied to their most awesome weapons of the eve of the war, this maximalist war. (pp. 177-178)

The soldiers on the front lines recognized that the war was like work in an abominable factory. César Méléra said revealingly at Verdun that it was "the bankruptcy of war, the bankruptcy of the art of war; the factory is killing art." Benjamin Crémieux, another combat veteran, commented, "The worst horror of this war, was that the men who made it were able to do so with the same conscience as any other work" (pp. 184-185).

But this work of war had unexpected results. One of the great victories of modernism was conquering nature with railroads, dams, cities, fast ships, planes, scientific farming, zoos, and museums. In World War I this domina-
tion of nature became insane, or so it seemed to the men who were there. Paul Nash, wounded at Ypres and then returned to the front as a war artist, describes the devastation:

Sunset and sunrise are blasphemous. . . . Only the black rain out of the bruised and swollen clouds . . . is fit atmosphere in such a land. The rain drives on, the stinking mud becomes more evilly yellow, the shell-holes fill up with green-white water, the roads and tracks are covered in inches of slime, the black dying trees ooze and sweat and the shells never cease. . . . They plunge into the grave which is this land. . . . It is unspeakable, godless, hopeless. (quoted in Stallworthy, 1984, p. 275)

Other wars had destroyed significant portions of nature, but the Great War cut a gigantic putrid wound across the heart of Europe from the Alps to the sea. One pilot called it “that sinister brown belt, a strip of murdered nature. It seems to belong to another world. Every sign of humanity has been swept away” (Hynes, 1991, p. 21). Unsurprisingly, for many people the belief in modernism, in progress itself, was fatally wounded. Ekstein notes that before the war modernism was “a culture of hope, a vision of synthesis.” After the war it was “a culture of nightmare and denial.” He goes on to quote Robert Graves, a veteran who awoke after one wounding to find himself in a morgue presumed dead, that the war provoked an “inward scream” and “the duty to run mad.” For Ekstein, “The Great War was to be the axis on which the modern world turned” (1989, p. 237); the turn was from life to death:

The Great War was the psychological turning point, for Germany and for modernism as a whole. The urge to create and the urge to destroy changed places. The urge to destroy was intensified; the urge to create became increasingly abstract. In the end the abstractions turned to insanity and all that remained was destruction, Gotterdammerung. (p. 329)

And Gotterdammerung came two decades later, at least at Dachau, Auschwitz, Treblinka, Hamburg, Dresden, Tokyo, Hiroshima, and Nagasaki. The military historian Robert O'Connell reaches a similar conclusion but puts special emphasis on how military technology, which had given Europe world dominance, had turned on the Europeans themselves:

The Great War had a profoundly lasting and deleterious effect on Western man's view of himself and his civilization which cannot be explained solely in political terms. Rather . . . at the root of this crisis of morale was a sudden awareness, engendered primarily by the stalemate on the western front, that military power, when applied, had grown uncontrollable, and that this was directly attributable to weapons technology. This judgment has not changed essentially to this day. Yet the abruptness of this occurrence,
the wholesale discrediting of a factor largely responsible for three hundred years of political transcendence in a mere four years of war, was such a shock and raised such profound questions about the basic directions of Western civilization that it created a crisis of the spirit unparalleled in modern times. (1989, Vol. 2, p. 242)

This crisis includes the very definitions of humans and machines. Klaus Theweleit, in *Male Fantasies*, his study of World War I German veterans, noticed a deeply erotic and ambivalent relationship between the soldiers and mechanization. "The new man," as these warriors described him, was "a man whose physique had been mechanized, his psyche eliminated—or in part displaced into his body armor" (1989, Vol. 2, p. 162).

The prowar writings of the veteran Ernst Jünger, for example, often focus on an imaginary man whose "instinctual energies have been smoothly and frictionlessly transformed into functions of his steel body." Theweleit sees a clear "tendency toward the utopia of the body-machine":

In the body-machine the interior of the man is dominated and transformed in the same way as are the components of the macromachine of the troop. For Jünger, then, the fascination of the machine apparently lies in its capacity to show how a man might "live" (move, kill, give expression) without emotion. Each and every feeling is tightly locked in steel armor. (p. 159)

Jünger affirms, "Yes, the machine is beautiful: its beauty is self-evident to anyone who loves life in all its fullness and power." In other words, the machine is alive. Theweleit draws links between "The Soldierly Body, the Technological Machine, and the Fascist Aesthetic" in a chapter of that name. He quotes Jünger, who said, "we must imbue the machine with our own inner qualities" in turn the "machine . . . should provide us with a higher and deeper satisfaction." In the end, the "machine" takes over from the body (p. 197). This self-mechanization performs a crucial function, a pleasurable function, for the soldier males—it allows them the release of killing and risking death. In Theweleit's words: "The crucial impulse behind the regeneration of the machine seems to be its desire for release—and release is achieved when the totality-machine and its components explode in battle" (p. 155). In this profane traffic between war, humans, and machines, in this dehumanization and mechanization, the psychological reality of cyborgs may first have been born. Theweleit's summary is all too clear:

At the same time, the unity and simplicity of the object-producing machine is dissolved; the machine becomes an expressive multiplicity of semi-human aesthetic forms. Thus the human being becomes an imperfect machine, and the machine an imperfect human being, neither any longer capable of producing, only of expressing and propagating the horrors they
have suffered. Perversely distorted, both now become destroyers; and real human beings, and real machines, are the victims of their mutual inversion. The expression-machine airplane drops bombs on production machines, as the mechanized bodies of soldier males annihilate bodies of flesh and blood. The libido of such men is mechanized and their flesh is dehumanized through mechanization. (p. 199)

This was not the experience of everyone in the Great War, to be sure. But it was the experience of enough western front poets, enough protofascist "front-line fighters" such as Adolf Hitler, enough men and women in all, that the idea of war out of control, whether it was a good or bad thing, entered deeply into the Western mass consciousness.

Even as World War I ran out of control, turning battle into an extended killing machine and planting the seeds of an even greater, more horrible war, other forms of control were brought into being. The modern state expanded in many directions through increased taxation, the regimentation of the economy and labor, and the institutionalization of everything from passports to art patronage.

In the United Kingdom and the United States the first truly systematic attempt to control war correspondents and manage the news were implemented (Knightley, 1975). At the same time, in a related development, this war to end war marked the fantastic growth in the size and power of the U.S. political intelligence system, which has continued to gain in influence and importance to this day (Donner, 1980).

In the United States science itself came under more direct government management in the name of war. For the first time, Army and Navy projects operating under secrecy found their way into the laboratories of the nation's colleges, at over 40 campuses. Many disciplines, especially physics and chemistry, were militarized. The war "forced science to the front," in the words of George Ellery Hale, one science manager (quoted in Kevles, 1987, p. 138).

At the front, science did its best to make war worse. Professor Fritz Haber, the pioneer of gas warfare whose mistaken judgments convinced the German General Staff to use gas, said on receiving the Noble Prize for Chemistry in 1919: "In no future war will the military be able to ignore poison gas. It is a higher form of killing" (quoted in Kevles, 1987, p. 137).

Chemists and chemical engineers were the most active of World War I scientists, so some have called it a chemist's war. Their most famous products were the poison gases, but they also produced a new generation of more effective explosives for guns, mines, grenades, bombs, torpedoes, and artillery shells (Harris and Paxman, 1982).

There were great advances in the science of ballistics as well, in improved mechanical calculators and theoretical advances. Several founders of computer science worked in these areas; the most famous, Norbert Wiener, calculated ordnance tables.
These technical innovations led to an incredible increase in the lethality of the battlefield through improvements in artillery and automatic weapons. It is under these conditions that a problem that perplexes military planners to this day first occurred—the collapse of whole armies under the stress of the conditions and heavy casualties of technological war. John Keegan lists the major instances:

A point was reached by every army at which either a majority or a disabling minority refused to go on. This point was reached by the French army in May 1917, when “collective indiscipline” occurred in 54 of 100 divisions on the Western Front; in the Russian Army in July 1917, when it failed to resist the German counter-attack consequent on the collapse of the “Kerensky Offensive”; in the Italian army in November 1917, when the Second Army disintegrated under German-Austrian attack at Caporetto. In March 1918, the British Fifth Army collapsed, as much morally as physically, and in October the German army in the west signified to its officers its unwillingness to continue fighting. (1976, p. 276)

Many of the horrible casualties these men rebelled against were caused by the military command’s faith in the warrior spirit, despite the reality of machine gun bullets. The French Army, for example, stressed the attack above all, to the death of many thousands of French soldiers (pp. 69–72). German, British, Russian, Australian, and Italian units were often thrown to destruction in World War I under the mistaken impression that force of will could directly overcome force of fire.

But the reverse certainly seems clear: Force of fire does overcome directly the force of will. Eric Leed put it plainly:

The sheer scale of technologically administered violence seemed to force the regression of combatants to forms of thought and action that were magical, irrational and mystical. . . . Magic is an appropriate resort in situations where the basis of survival could not be guaranteed by any available technology. (quoted in Holmes, 1986, p. 238)

It was often the machine gun, that most industrial of weapons, that reduced the soldiers to primitives. The machine gun was just over five decades old by 1914, but few military men realized that it would become one of the dominant weapons of the next 50 years. Invented by Americans, but little used in the Civil War, the machine gun was first widely deployed as a colonial weapon. In numerous battles in Asia and Africa the machine gun saved the day for the empire. At the battle of Omdurman in the Sudan six Maxim guns killed thousands of dervishes. G. W. Stevens described the scene:

It was not a battle, but an execution. . . . The bodies were not in heaps . . . but . . . spread evenly over acres and acres. Some lay very composedly with
their slippers placed under their heads for a last pillow; some knelt, cut short in the middle of a last prayer. Others were torn apart. (quoted in R. O'Connell, 1989, p. 233)

Often the guns were owned and operated by private companies, taking the political control that preceded their economic restructuring of non-European countries. For many colonialists the machine gun proved the superiority of Europeans. John Ellis notes ironically in his brilliant book, *The Social History of the Machine Gun*:

The Europeans had superior weapons because they were the superior race. With regard to the machine gun, for example, one writer assured his readers that “the tide of invention which has . . . developed the ‘infernal machine’ of Fiechi into the mitrailleur [sic] and Gatling Battery of our own day—this stream took its rise in the God-like quality of reason.” Thus when the Europeans opened their bloody dialogue with the tribes of Africa it was only natural that they should make them see reason through the ineluctable logic of automatic fire.

In one action between employees of the German East Africa Company and Hehe tribesmen, two men and two machine guns killed roughly a thousand native combatants. In Tibet one British machine gunner became ill at the slaughter. His commander told him to think of his targets as game. In Rhodesia a tribesman asked, who are “the naked Matabele to stand against these guns?” And in Nigeria, another tribesman remarked, “War now be no war. I savvy Maxim gun kill Fulani five hundred yards, eight hundred yards far away. . . It be no blackman . . . fight, it be white man one-side war” (quoted in R. O’Connell, 1989, pp. 233–234).

The United States also found machine guns useful. They were quite important during the Spanish–American War, notably at the charge up San Juan Hill and during the pacification of the Philippines. They also proved effective in the suppression of the Boxer Rebellion. Yet, despite these military successes, neither the European nor the American armies that used the machine gun in colonial wars developed a real understanding of what it would mean when two modern armies met. David Armstrong, author of a historical study of the U.S. Army and machine guns, concludes:

Creation of a coherent body of tactical doctrine was not a topic of major interest in the higher echelons of the army for much of the period before World War I. Like the majority of their European counterparts, most American soldiers did not understand the extent of the changes in warfare that had occurred as the result of fifty years of rapid technological progress; consequently they failed to realize how outdated their tactical concepts
actually were. Doctrine was no longer a set of relatively simple rules that prescribed how men and weapons were to be maneuvered on the field of battle; it was, instead, a complex intellectual framework that enabled soldiers to conduct the intricate operations required in an arena that was increasingly dominated by the machines and techniques of modern industry. (1982, p. 212)

So when the Great War came there was great confusion. Gen. Douglas Haig claimed that the machine gun would lead to the return of cavalry (Ellis, 1973, p. 130). In the trenches the horrific effectiveness of machine guns led to a number of different reactions. Some soldiers even idolized the machine gunners of the enemy who killed so well.

Among the machine gunners themselves a great dehumanization took place. Ellis quotes extensively from the experiences of one British officer, Lt. Col. G. S. Hutchison, who later wrote a history of the Machine Gun Corps. After most of his company was wiped out during the second battle of the Somme he got hold of a machine gun and caught a group of Germans silhouetted against the skyline. “I fired at them and watched them fall, chuckling with joy at the technical efficiency of the machine.” Later in the battle he turned his gun upon a battery of German artillery “laughing loudly as I saw the loaders fall.” Near the end of the war he helped crush the German offensive of 1918 and remembers machine gunning retreating Germans as “thrilling.” On the same day he found a group of drunk stragglers from his own army. At machine gun point he forced them to attack the Germans. “They perished to the man” (pp. 144–145), he remarks cheerfully. What kind of man is this?

Barbara Ehrenreich recognizes him as a war-man. She points out that many of the men who started World War II

[did] not emerge on the plain of history fresh from the pre-Oedipal nursery of primal emotions, but from the First World War. That war was a devastating experience not only for the men who lost, like these, but for those who “won.” . . . In considering the so-far unending history made by men of the warrior caste, it may be helpful to recall that it is not only that men make wars, but that wars make men. For the warrior caste, war is not only death production, but a means of reproduction; each war deforms the human spirit and guarantees that the survivors—or some among them—will remain warriors. (1987, p. xvi; emphasis in original)

As Ehrenreich says so well, World War I made the men who made World War II; so the one war certainly made the other, as wars have bred wars down through history. Still, World War II was unusual. It not only bred more wars, but it birthed a new type of war as well, postmodern war.