A Revolution in Warfare

Eliot A. Cohen

TECHNOLOGY STRIKES AGAIN

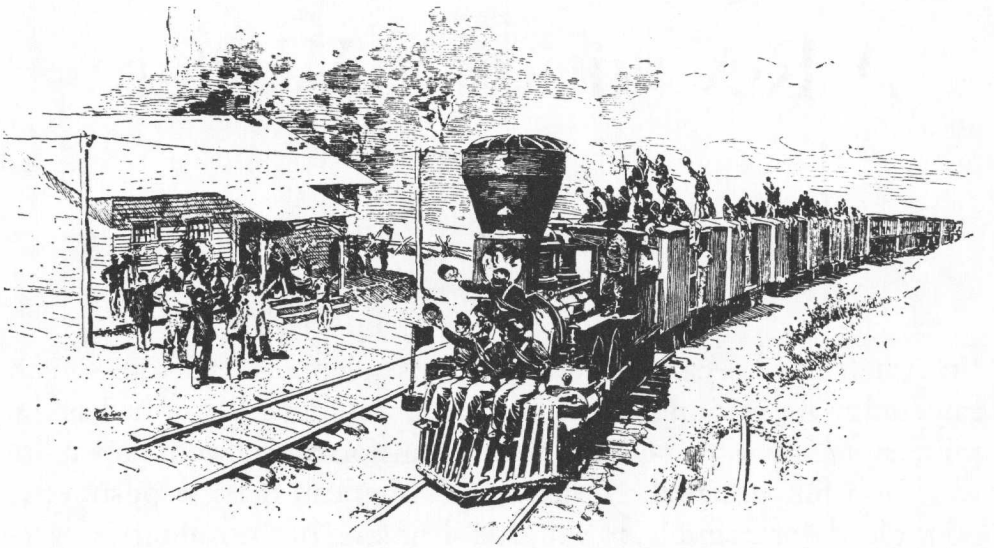
FOR ALMOST a decade American defense planners have foreseen an impending revolution in military affairs, sometimes described as the military-technical revolution. Such a transformation would open the way for a fundamental reordering of American defense posture. It might lead, for example, to a drastic shrinking of the military, a casting aside of old forms of organization and creation of new ones, a slashing of current force structure, and the investment of unusually large sums in research and development.

Such a revolution would touch virtually all aspects of the military establishment. Cruise missiles and unmanned aerial vehicles would replace fighter planes and tanks as chess pieces in the game of military power. Today's military organizations—divisions, fleets, and air wings—could disappear or give way to successors that would look very different. And if the forces themselves changed, so too would the people, as new career possibilities, educational requirements, and promotion paths became essential. New elites would gain in importance: "information warriors," for example, might supplant tankers and fighter pilots as groups from which the military establishment draws the bulk of its leaders.

The proponents of this view have turned to history to illustrate—and in some measure to create—their theory of radical change. It is, therefore, proper to ask whether the historical record substantiates their claims.[1]

Most soldiers, in their heart of hearts, would agree with Cyril Falls, a military historian of an older generation, who noted in his

ELIOT A. COHEN is Professor of Strategic Studies at the Paul H. Nitze School of Advanced International Studies, The Johns Hopkins University.



BETTMANN

1953 work *A Hundred Years of War, 1850-1950:*

> Observers constantly describe the warfare of their own age as marking a revolutionary breach in the normal progress of methods of warfare. Their selection of their own age ought to put readers and listeners on their guard. . . . It is a fallacy, due to ignorance of technical and tactical military history, to suppose that methods of warfare have not made continuous and, on the whole, fairly even progress.

The cautious military historian (and even more cautious soldier) looks askance at prophets of radical change, although by no means at change itself. Unquestionably, military technology has never stood still. In the eighteenth century, for example, minor improvements in the design and manufacture of gun barrels and carriages, coupled with the standardization of cannon calibers, laid the groundwork for the vastly improved cannonades of the armies of the French Revolution and Empire. At the same time, on closer inspection the apparently rapid rate of change in modern warfare may prove deceptive. Despite the attention the press

[1]One of the few essays that does so is Peter Paret, "Revolutions in Warfare: An Earlier Generation of Interpreters," in Bernard Brodie, Michael D. Intrilligator, and Roman Kolkowicz, eds., *National Security and International Stability,* Cambridge: Oelgeschlager, Gunn & Hain, 1983, pp. 157-69. See also Andrew F. Krepinevich, "Cavalry to Computer," *The National Interest,* Fall 1994, pp. 30-42.

lavished on "smart" bombs during the 1991 Persian Gulf War, for example, most of the ordnance in that conflict consisted of 1950s-technology unguided bombs dropped by aircraft developed in the 1960s or in some cases 1970s. This being so, whence comes the contention that the United States is undergoing a revolution in military affairs?

THE RUSSIANS SAW IT COMING

BEGINNING IN the early 1980s Soviet observers led by Marshal Nikolai Ogarkov, then chief of the general staff, advanced the notion of an imminent technical revolution that would give conventional weapons a level of effectiveness in the field comparable to that of small tactical nuclear weapons. Armor on the march might find itself detected and attacked by conventional missiles showering self-guided antitank weapons, in an operation conducted from a distance of several hundred miles and with as little as 30 minutes between detection and assault. The Soviets found their reading of the military future profoundly disheartening, since it promised to thwart their strategy in case of war in Western Europe, which rested on the orderly forward movement of massed echelons of tanks and armored vehicles. They realized, moreover, that their country, incapable of manufacturing a satisfactory personal computer, could not possibly keep up in an arms race driven by the information technologies.

Soviet conceptions of a military-technical revolution seeped into the West, chiefly through the U.S. Department of Defense and its Office of Net Assessment. It gradually became clear that the Soviets had portrayed the revolution too narrowly. They had focused on one type of warfare in a single theater—armored conflict in Central Europe—and concentrated almost exclusively, as befitted the materialism of Marxist-Leninist thought, on technology and weapons rather than the organizational dimension of warfare. With the groundwork laid for an American assessment, the 1991 war with Iraq crystallized awareness among military planners in the United States on this momentous issue.

Many exponents of air power declared that in the Persian Gulf War the technology had finally caught up with the promise of air operations, first articulated in the period between the world wars; the revolution, they said, was in the realization of the 50-year quest for the decisive ap-

plication of air power in war. Yet the conduct of the war against Iraq had very little to do with the kinds of operations envisaged by the original theorists of air warfare. No theorist in the 1920s imagined it would be possible to take down telecommunications systems or to conduct extensive attacks in densely populated areas without killing many civilians. The Gulf War showed air power off to great advantage but in extremely favorable circumstances: the United States brought to bear a force sized and trained to fight the Soviet Union in a global war, obtained the backing of almost every major military and financial power, and chose the time and place at which combat would begin in a theater ideally suited to air operations. Knowledgeable observers remained skeptical that a revolution had taken place.

The military revolution will be in part an information revolution.

A third version of the revolution has come from the American military. Admiral William Owens, vice chairman of the Joint Chiefs of Staff, has written of a "system of systems"—a world in which the many kinds of sensors, from satellites to shipborne radar, from unmanned aerial vehicles to remotely planted acoustic devices, will provide information to any military user who needs it. Thus a helicopter might launch a missile at a tank a dozen miles away based on information derived from airborne radar or satellite imagery. In this view the revolution in military affairs consists of the United States' astounding and unprecedented ability to amass and evaluate enormous quantities of information about any given battle arena—Owens has referred to a 200-mile-by-200-mile box—and make near-instantaneous use of it.

Ground soldiers are particularly dubious about the system of systems. They wonder whether any technologist can disperse what Carl von Clausewitz called the fog of war and ask what will happen when an opponent attempts to conceal its force or attacks the information systems that observe it. Even in naval warfare, where the system of systems originated, sea and storm can make it difficult to know all that goes on in a box of the kind described by Owens. The admiral's version of the military revolution focuses almost entirely on technology rather than on the less tangible aspects of warfare. As yet, it bespeaks an aspiration, not a reality, and it is predicated on the inabil-

ity of other countries to systematically deny the United States the information its weapons systems need.

The Soviet, air power, and Owens versions of the revolution in military affairs all offer only partial insights into a larger set of changes. A revolution has indeed begun. But it will be shaped by powerful forces emanating from beyond the domain of warfare. It will, moreover, represent the culmination in modern military organizations of a variety of developments, some of them dating back decades. To understand it, one must begin with its origins.

REVOLUTION FROM THE OUTSIDE

FROM TIME to time dramatic changes in warfare occur as a consequence of forces endogenous to war. Military research and development programs gave birth to the nuclear revolution, and although space exploration has many civilian spinoffs, military resources drove it in its early phases. Submarine warfare, which gave weaker naval powers a tremendously potent tool against stronger ones, also originated in the military. Just as often, however, the driving forces behind a change in the conduct of war lie in the realms of political and economic life.

The transformation of warfare in the nineteenth century offers a particularly useful analogy for contemporary strategists. Describing the posture of Austria and Prussia at the outset of the French Revolution, Clausewitz noted in *On War* that the two countries resorted to the kind of limited war that the previous century had made familiar in Europe. However,

> they soon discovered its inadequacy. . . . People at first expected to have to deal only with a seriously weakened French army; but in 1793 a force appeared that beggared all imagination. Suddenly war again became the business of the people—a people of thirty millions, all of whom considered themselves to be citizens. . . . The resources and efforts now available for use surpassed all conventional limits; nothing now impeded the vigor with which war could be waged, and consequently the opponents of France faced the utmost peril.

The advent of broadly based conscription greatly enlarged armies and increased their durability. The secret of the success of the French revolutionary armies lay not in their skill on the battlefield—the reviews

there are mixed—but in the new regime's ability to replenish its forces repeatedly after defeat and in the opening of military advancement to all classes of citizen. The age of the mass army had arrived.

Civilian technologies have also brought revolutionary change in warfare. The mass-produced rifle of the nineteenth century complicated the task of military tacticians enormously, while the appearance of the railroad and telegraph altered war even more. Generals could shuttle armies from one theater to another in weeks, a feat demonstrated in spectacular fashion during the Civil War when the Union shifted 25,000 troops, with artillery and baggage, over 1,100 miles of rail lines from Virginia to Chattanooga, Tennessee, in less than 12 days. Furthermore, the railroad, in conjunction with the mass army, made mobilization at the outset of war a critical element in the efficiency of a military organization.

The telegraph affected not only armies and governments but newspapers. It helped general staffs coordinate rapid mobilization and launch large military movements. Even more important, the rapid dissemination of news transformed the nature of civil-military relations in wartime, creating new opportunities for tension. Politicians discovered, to their consternation, that the literate publics of modern states could learn of events on the battlefield almost immediately from mass circulation newspapers. At the same time, generals discovered that political leaders could now communicate with them in the field, and would gladly do so. During the Civil War the Union established a military telegraph system, laying some 15,000 miles of wires, but placed it under civilian control rather than the Army Signal Corps'; Secretary of War Edwin M. Stanton made certain the lines terminated in his office, not that of the army's senior general. With knowledge came intervention—or interference, as many a Union general keenly felt it. As the wars of German unification went on, Field Marshal Helmuth Graf von Moltke felt the same way about the suggestions Bismarck telegraphed his subordinates, and attempted to restrict the information flowing over the wires to higher headquarters.

The contemporary revolution in military affairs, like those of the nineteenth century, has its origins in the civilian world, and in two developments in particular. The first is the rise of information technologies, which have transformed economic and social life in ways

that hardly need elaboration. The consequences for military organizations are numerous; the development of intelligent weapons that can guide themselves to their targets is only one, and not necessarily the most important. The variety and ever-expanding capabilities of intelligence-gathering machines and the ability of computers to bring together and distribute to users the masses of information from these sources stem from the information revolution. Small wonder that a group of senior Marine Corps officers, led by the assistant commandant of the corps, visited the New York Stock Exchange recently to learn how brokers absorb, process, and transmit the vast quantities of perishable information that are the lifeblood of the financial markets.

The efflorescence of capitalism in the United States and abroad constitutes a second driving force. In the years after World War II, even Western nations spent a great deal of their national wealth on defense and created vast state bureaucracies to provide for every military need and function. Today very few states can successfully resist the pressures of postindustrial capitalism. Military dimensions include the sale of government-owned defense industries around the world and the increasing privatization of military functions; private contractors, for instance, handled much of the logistics for the U.S. operations in Haiti and Somalia. In a world where commercial satellites can deliver images of a quality that only a few years ago was the prerogative of the superpowers, military organizations are more and more willing to use civilian systems for military communications and even intelligence gathering rather than spend to develop their own. Furthermore, the end of the Cold War has freed up the markets in military goods and services. Countries can gain access to a wide spectrum of military capabilities for ready cash, including the services of skilled personnel to maintain and perhaps operate high-technology weapons. For much of this century armed forces could ignore the market, practicing a kind of military socialism in a sea of capitalism; no longer.

Politics and economics often drive changes in the conduct of war.

To know what the revolution in military affairs will look like, we need the answers to four questions. Will it change the appearance of combat?

Will it change the structure of armies? Will it lead to the rise of new military elites? Will it alter countries' power position? Reflection on each of these suggests that this is the eve of a far-reaching change in warfare whose outlines are only dimly visible but real nonetheless.

THE FORMS OF COMBAT

A TRANSFORMATION of combat means change in the fundamental relationship between offense and defense, space and time, fire and maneuver. The advent of carrier-based warfare provides an example. Warfare in the age of battleships took place within visual range, between tightly drilled formations of ships of the line that battered each other with their big guns. Once carriers came on the scene, fleets struck at one another from hundreds of miles away, and their blows were not repeated salvos but massed air raids; fighting now depended on "one large pulse of firepower unleashed upon the arrival of the air wing at the target," as Wayne Hughes put it in his 1986 *Fleet Tactics.* The firepower revolution of the late nineteenth century rested on the adoption of the rifle and subsequent improvement of the weapon with smokeless powder, breechloading, and metal cartridges. In short order the densely packed battlefield of the early American Civil War gave way to the empty battlefield of modern times, in which small groups of soldiers scurry from shellhole to shellhole, eschewing the massed rush that dominated tactics for almost two centuries.

Today the forms of combat have begun a change no less dramatic. A military cliché has it that what can be seen on the modern battlefield can be hit, and what can be hit will be destroyed. Whereas at the beginning of the century this applied with deadly certainty only to front-line infantrymen, it now holds not only for machines on the front lines but for supporting forces in the rear. The introduction of long-range precision weapons, delivered by plane or missile, together with the development of intelligent mines that can be activated from a remote location, means that sophisticated armies can inflict unprecedented levels of destruction on any large armored force on the move. Fixed sites are also increasingly vulnerable.

The colossal maneuvers of the coalition armies in the deserts of Kuwait and Iraq in 1991 may in retrospect appear, like the final

charges of cavalry in the nineteenth century, an anomaly in the face of modern firepower. Future warfare may be more a gigantic artillery duel fought with exceptionally sophisticated munitions than a chesslike game of maneuver and positioning. As all countries gain access to the new forms of air power (space-based reconnaissance and unmanned aerial vehicles), hiding large-scale armored movements or building up safe rear areas chock-a-block with ammunition dumps and truck convoys will gradually become impossible.

From the middle of the nineteenth century until very recently, platforms dominated warfare: the newest ship, plane, or tank outclassed its rivals and in most cases speedily rendered them obsolete. But this was not always the case. Until the 1830s, for example, naval technology remained roughly where it had been since the mid-eighteenth century. Nelson's *Victory* was laid down in 1759, launched in 1765, served brilliantly at Trafalgar in 1805, and was paid off only in 1835—a service life of 70 years. Steam propulsion and metal construction changed all that, and a period of near-constant technological change ensued, in which naval superiority seemed to shift rapidly from power to power depending on who had the most recently built warship.

> What can be seen by high-tech sensors can be hit, and what can be hit will be destroyed.

The wheel has now turned again. The platform has become less important, while the quality of what it carries—sensors, munitions, and electronics of all kinds—has become critical. A modernized 30-year-old aircraft armed with the latest long-range air-to-air missile, cued by an airborne warning plane, can defeat a craft a third its age but not so equipped or guided. In a world dominated by long-range, intelligent precision weapons, the first blow can prove decisive; the collapse of the Iraqi air defense system in 1991 within a few hours of a sophisticated air attack is a case in point. As a result, incentives for preemption may grow. For two duelists armed with swords approaching each other from a dozen yards' distance, it makes little difference who unsheathes his weapon first. Give them pistols, however, and all odds favor the man quicker on the draw.

Furthermore, the nature of preemption itself may change. To the extent that information warfare, including the sabotage of com-

puter systems, emerges as a new type of combat, the first blow may be covert, a precursor to more open and conventional hostilities. Such attacks—to which an information-dependent society like the United States is particularly vulnerable—could have many purposes: blinding, intimidating, diverting, or simply confusing an opponent. They could carry as well the threat of bringing war to a country's homeland and people, and thus even up the balance for countries that do not possess the conventional tools of long-range attack, such as missiles and bombers. How such wars initiated by information strikes would play themselves out is a matter of tremendous uncertainty.

THE STRUCTURE OF MILITARY ORGANIZATIONS

IT IS not merely the tools of warfare but the organizations that wield them that make for revolutionary change in war. The invention of the tank—itself a cluster of technologies—did not bring about the armored warfare revolution, nor did the acquisition of tanks in quantity allow countries to exploit the new technology equally. The raw conceptual ingredients for blitzkrieg existed as early as 1918, when J.F.C. Fuller devised Plan 1919 for the British army as it prepared its final assault into Germany. But it took armed forces more than 20 years to put the ideas into practice. The Germans had fewer (and in some respects inferior) tanks in 1940 than the British and French. They succeeded not because of material superiority but because they got several things right—supporting technologies such as tank radios, organization, operational concepts, and a proper climate or culture of command.

The construction of the Panzer division reflected a careful working out of the requirements of modern warfare. Whereas the French and British created armored divisions consisting almost exclusively of tanks, the Germans made theirs combined arms organizations built around the tank. The Germans saw the need for units of engineers and infantry to accompany the tanks, allowing them to develop their striking power to the fullest. To enable the new organizations to function, the German military had to cultivate a particular climate of command. An American liaison officer in the

1930s noted that the Germans made decisions with far less preparation than their American counterparts:

> The Germans point out, that often a Commander must make an important decision after only a few minutes' deliberation and emphasize, that a fair decision given in time for aggressive execution is much better than one wholly right but too late. They visualize rapidly changing situations in modern warfare and are gearing their command and staff operations accordingly.[2]

Fortunately for the Germans, the Panzer division fit well with prearmored doctrine and military culture. The contemporary revolution in military affairs may require similar but more painful evolution. Armed forces do not know what the Panzer division of the future will look like, much less how to create it, but one can advance some tentative descriptions of the military of the next century. To begin with, the new military will rest primarily on long voluntary service. The balance between quality and quantity has shifted in favor of quality, and it is no mere drive for economy (because professional militaries are not cheap) that has led countries either to give up conscription or to create two separate militaries, one conscript and one professional, with ever more attention and resources going to the latter. At long last, after a reign of almost two centuries, the age of the mass military manned by short-service conscripts and equipped with the products of high-volume military manufacturing is coming to an end.

The new military will be an increasingly joint force—or perhaps, one might say, less and less a traditional, service-oriented force. In militaries around the world the traditional division into armies, navies, and air forces (and in only a few countries, marine corps) has begun to break down. Not only have air operations become inseparable from almost any action on the ground, but naval forces increasingly deliver fire against a wide range of ground targets. Quasi services have begun to emerge. In all militarily sophisticated countries special forces have grown, imitating

[2]Albert C. Wedemeyer, "Memorandum: German General Staff School Report," July 11, 1938, p. 12. This is one of the most insightful accounts of the temper and tone of the German army before World War II. See also the masterly survey in Herbert Rosinski, *The German Army*, London: Hogarth Press, 1939.

the highly successful models of the British Special Air Service and its American and Israeli counterparts. Even regular infantry formations have adopted the tactics of special forces—very small units, dispersion, and the extensive use of fire brought to bear from the air or rear areas. Other quasi services include organizations oriented toward space and information warfare and the horde of civilian contractors who fix airplanes, build bases, pay the troops, operate mess halls, and analyze operations.

Another structural change looms. Tack an organizational chart of an army corps on a wall, and next to it place a similar chart for a leading corporation of the 1950s—General Motors, say—and the similarities stand out. One would see in both cases a classical pyramid, small units reporting up to progressively smaller numbers of larger organizations. The organization of a corps has not changed much since then, but the cutting-edge corporation of today is not GM but Microsoft or Motorola, neither of which much resembles an army corps. The modern corporation has stripped out layers of middle management, reduced or even eliminated many of the functional and social distinctions between management and labor that dominated industrial organizations, and largely abolished the old long-term tenure and compensation systems, including company-based pensions. By and large, military organizations have not done this. "Management" still consists of commissioned and noncommissioned officers, and although the latter play a role quite different from that of even their World War II counterparts, they still operate within rank, deference, and pay structures of a bygone time. The radical revision of these structures will be the last manifestation of a revolution in military affairs, and the most difficult to implement.

THE NATURE OF COMMAND

IN A PERIOD of revolutionary change in the conduct of war, different kinds of people—not simply the same people differently trained—rise to the top of armed services. For instance, air power gave birth to entirely new kinds of military organizations; unlike armies and navies, air forces consist of a tiny percentage of officer-warriors backed by an elaborate array of enlisted technicians. To take another example: in the late nineteenth century it became clear that the increasingly complex problem of mobilizing reservists and deploying them over a country's railroad net-

work required a corps of technocratic experts. The American Civil War and the Franco-Prussian War demonstrated that dash and bravura could not compete with skill at scheduling large numbers of locomotives, handling loading manifests, and repairing damaged track. The logistical manager had become an indispensable member of a general staff and a well-trained general staff an essential feature of a military establishment.

A similar evolution is under way today. Even in the U.S. Air Force, an organization dominated by pilots (bomber pilots in the 1950s and 1960s, fighter pilots thereafter), the number of general officers in important positions who are not combat aviators has risen. The new technologies will increasingly bring to the fore the expert in missile operations, the space general, and the electronic warfare wizard—none of them a combat specialist in the old sense and a fair percentage of them, sooner or later, female. Military organizations still need, and will always need, specialists in direct combat. Indeed, both the lethality of direct combat and its physical and intellectual demands have grown. But the number of such fighters in military organizations, both in absolute terms and in proportion to the overall size of the militaries, has declined steadily since the beginning of the century and will continue to do so. The cultural challenge for military organizations will be to maintain a warrior spirit and the intuitive understanding of war that goes with it, even when their leaders are not, in large part, warriors themselves.

After two centuries, the age of the mass army is drawing to a close.

Different eras in warfare give rise to characteristic styles of military leadership. The age of industrial warfare has ended, and with it a certain kind of supreme command. Shortly after the mobilization against Austria in 1866, an aide found the Prussian chief of the general staff, Helmuth Graf von Moltke, lying on a sofa reading a novel. On the evening before D-Day, General Dwight D. Eisenhower, supreme commander of Allied forces, could be found on his sofa doing precisely the same thing. Despite the 80 intervening years, some features of supreme command remained constant: the general in chief and his staff assembled a vast force, planned its intricate movements, and then spent the next day or two letting the machine conduct its initial operations on virtual autopilot. Today, an aide would more likely find a field marshal pacing

back and forth in an electronic command post, fiddling with television displays, talking to pilots or tank commanders on the front line by radio, and perhaps even peeking over their shoulders through remote cameras.

That the modern field marshal can sit invisibly in the cockpit with a pilot or perch cybernetically in the hatch of a tank commander raises a profound problem of centralization of authority. Although all military organizations pay lip service to delegation of maximum authority to the lowest levels of command, few military leaders can resist the temptation to dabble in their subordinates' business. The easier it is for them to find out what that business is, even though they are 10,000 miles away, the more likely they are to do so. Political leaders will have the same capability, and although for the moment most of them show little inclination to meddle, one can imagine situations in which they would choose otherwise.

THE POWER OF STATES

FEW SUBJECTS exercise historians of early modern Europe more than the military revolution of the sixteenth and early seventeenth centuries. Yet all would agree that that period's remarkable set of changes profoundly altered the relative balance of power between Europe and the rest of the world in Europe's favor. The creation of modern military organizations—that is, armies led by professional officers, trained and organized according to impersonal standards of discipline and behavior—coupled with the appearance of governments that could mobilize both soldiers and financial resources, changed the international system. The rise of Holland and the decline of the Ottoman Empire represent the opposite extremes of the consequences of the revolution.

The contemporary revolution in military affairs offers tremendous opportunities to countries that can afford to acquire expensive modern weaponry and the skills to use it properly. An accurate measurement of Israel's power potential relative to its Arab neighbors, for example, would probably show a steep rise since 1973. Taiwan, Singapore, and Australia, to take just three examples, can do far more against potential opponents than would have been thinkable 30 years ago. As we have seen, the military leadership of the Soviet Union believed the revolutionary changes it saw coming would put it at a dis-

advantage. Indeed, only the United States, with its vast accumulation of military capital, better than four times the defense budget of the next leading power, and an unsurpassed ability to integrate large, complicated technological systems, can fully exploit this revolution.

Transformation in one area of military affairs does not, however, mean the irrelevance of all others. Just as nuclear weapons did not render conventional power obsolete, this revolution will not render guerrilla tactics, terrorism, or weapons of mass destruction obsolete. Indeed, the reverse may be true: where unconventional bypasses to conventional military power exist, any country confronting the United States will seek them out. The phenomenon of the persistence of older systems in the midst of revolutionary change occurs even at a tactical level. After the arrival of the carrier as the capital ship of naval warfare, for example, the venerable battleship did not disappear but instead acquired two important roles: shore bombardment platform and vast floating air defense battery. Battleships were part of the American fleet as recently as the Persian Gulf War, almost half a century after their day as the queens of naval warfare had passed.

To the extent that the revolution proceeds from forces in the civilian world, the potential will exist for new military powers to emerge extremely rapidly. A country like Japan or, in a few years, China will quickly translate civilian technological power into its military equivalent. An analogy might be Germany's acquisition of a modern air force in the space of less than a decade in the 1930s. At a time when civilian and military aviation technologies did not diverge too greatly, Germany could take the strongest civilian aviation industry in Europe and within a few years convert it into enormous military power, much as the United States would do a few years later with its automobile industry. After a long interval during the Cold War when military industry became an exotic and separate entity, the pendulum has begun to swing back, and economic strength may again prove easily translatable into military power.

THE CHANGING ORDER

REVOLUTIONARY CHANGE in the art of war stems not simply from the ineluctable march of technology but from an adaptation of the military instrument to political purposes. The subject of armored warfare

languished in Great Britain and France between the world wars because those governments saw little need for an operationally offensive force on the continent. The powers that contemplated offensives to regain lost territories or to seize new ones—the Soviet Union and Germany—developed the armored instrument more fully than other states.

The United States may drive the revolution in military affairs, but only if it has a clear conception of what it wants military power for—which it does not now have. Indeed, when the Clinton administration formulated its defense policy in 1993 it came up with the Bottom-Up Review, which provided for a force capable of fighting simultaneously two regional wars assumed to resemble the Gulf War of 1991. By structuring its analysis around enemy forces similar to those of Iraq in that year—armor-heavy, with a relatively large conventional but third-rate air force—it guaranteed a conservatism in military thought at odds with the thorough reexamination promised by the administration early in its tenure. For this reason, among others, the revolution will take far longer to consummate than the Soviets predicted in the 1980s. Barring the pressure of a severe competition between the United States and some state capable of posing a real challenge to it, even available technologies are unlikely to be exploited fully. Military institutions in peacetime will normally evolve rather than submit to radical change.

The revolution offers opportunities to both small and great, but to the U.S. most of all.

World politics will also shape the revolution. One feature will certainly be the predominance of conventional warfare for limited objectives. Until the end of the Cold War, the possibility of total war, as in the great struggles of the first half of this century, dominated the planning of the American and Soviet military establishments, and perhaps others as well. With some exceptions, military action for limited ends seems more likely in the years ahead.

The most useful metaphor for the future military order may be a medieval one. During the Middle Ages, as at present, sovereignty did not reside exclusively in states but was diffused among political, civic, and religious bodies—states, but also sub- and supra-state entities. Warfare was not, as it has been in the modern period, an affair almost exclusively of states, but one that also involved private entities such as religious or-

ders and other associations. Then, unlike during the past two centuries, military technology varied widely among combatants—an army of English bowmen and knights fought very differently from the Arab warriors of Saladin or the Mongol cavalry of Genghis Khan or the pike-wielding peasantry of Switzerland. Militaries defied comparison; their strength varied greatly depending on where and whom they were fighting.

Opacity in the matter of military power may prove one of the most troubling features of the current revolution. The wildly inaccurate predictions of casualties in the Gulf War from responsible and experienced observers (including military estimators, let it be noted) reflected not conservatism or incompetence but a disjunction between the realities of military power and conventional means of measuring it. Numbers of tanks, airplanes, and soldiers and more elaborate firepower-based measurements of military might were always questionable, but now they say almost nothing about real military effectiveness. As platforms become less important and the quality of munitions and, above all, the ability to handle information become more so, analysts will find it ever more difficult to assess the military balance of opposing sides. If Admiral Owens is right, the revolution in military affairs may bring a kind of tactical clarity to the battlefield, but at the price of strategic obscurity.

In the nineteenth and early twentieth centuries, God may not always have been on the side of the bigger battalions, as the saying went, but victory usually was. Future technologies, however, may create pockets of military capability that will allow very small states to hold off larger ones, much as companies of Swiss pikemen could stop armies sweeping through their mountain passes or a single, well-fortified castle could hold immensely larger forces at bay for months. Herein lies a potential challenge even for the United States, which will find itself attempting to project military power for limited purposes and at a low cost in materiel and lives. Other parties may well decide to inflict some hard, if not fatal, blows to stave off American intervention. For stymieing the American advantage in the megasystems of modern military power—fantastically expensive and effective aircraft carriers or satellites, for example—the microsystems of modern military technology, such as the cruise missile, may prove sufficient.

The predominance of warfare for limited objectives, the availability of vast quantities of centralized information, and the obscurity of

military power may combine to make civil-military relations more awkward. Politicians will seek to use means they can readily see, as it were, but do not understand; generals will themselves be handling forces they do not fully comprehend and will be divided on the utility of various forms of military power.

In every previous period of revolutionary change in the conduct of war, military leaders made large mistakes. The human toll on European armies coming to terms with modern firepower in World War I reflected not only, or even primarily, the incompetence of generals but their bafflement in the face of new conditions of warfare. Less costly but no less time-consuming was the difficulty the U.S. Navy had developing the multi-carrier task forces that would ultimately enable it to sweep the Pacific clear of Japanese forces in World War II. The lesson of the 1942 Battle of Midway had appeared to be that the massing of carriers offered great advantages but posed no lesser vulnerabilities, should the defending side be caught while rearming its strike aircraft. As a result, the transformation of naval warfare by the carrier could not be realized until one side either felt overwhelming pressure to mass carriers despite the risks—the case in the early part of the war—or had enough carriers to make the risks bearable. For the United States the latter did not occur until almost two years after it entered the war, when the naval building program had produced the sheer numbers of vessels adequate for large-scale carrier operations.

A revolution in military affairs is under way. It will require changes of a magnitude that military people still do not completely grasp and political leaders do not fully imagine. For the moment, it appears to offer the United States the prospect of military power beyond that of any other country on the planet, now and well into the next century. Small wonder, then, that by and large American theorists have embraced the idea of a revolution in warfare as an opportunity for their country, as indeed it is. But revolution implies rapid, violent, and, above all, unpredictable change. Clio has a number of lessons to teach Mars, but perhaps none is more important than that.