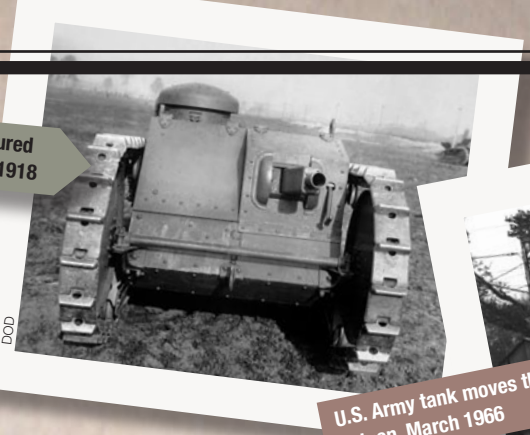

Two-man tank manufactured by Ford Motor Company, 1918

DOD

U.S. Army tank moves through Saigon, March 1966

DOD

U.S. Army M1 Abrams tank patrols Tal Afar, Iraq

U.S. Air Force Combat Camera Squadron (Jason Kuiper)

What the Past Teaches about the Future

By MAX BOOT

out of setbacks were born new ways of fighting that led once-vanquished forces to victory on future battlefields

Many of the innovations on the horizon in fields such as robotics, directed energy, computers, genetic engineering, and nanotechnology have the potential to change the nature of warfare radically and with it the nature of the international system. While the United States has been dominant so far in the information age, there is no guarantee that its streak will continue. A challenger, whether a rival state such as China or even a nonstate group such as al Qaeda, could use new (or, in the case of nuclear weapons, not so new) ways of war to alter the balance of power. Cheap to produce and easy to disseminate, germs, chemicals, and cyberviruses are particularly well suited for the weak to use against the strong. If any of these become common and effective tools of warfare, especially terrorist warfare, the United States and its allies could be in deep trouble.

History is full of superpowers failing to take advantage of important revolutions in military affairs (RMAs): the Mongols missed the gunpowder revolution; the Chinese, Turks, and Indians missed the industrial revolution; the French and British missed major parts of the second industrial revolution; and the Soviets missed the information revolution. The warning that appears at the bottom of mutual fund advertisements applies to geopolitics: *past performance is no guarantee of future returns*. The end can come with shocking suddenness, even after a long streak of good fortune.

Perhaps *especially* after a long streak of good fortune. The longer you are on top, the more natural it seems, and the less thinkable it is that anyone will displace you. Complacency can seep in, especially if, as with the United States, you enjoy power without peer or precedent.

Israel discovered the dangers of primacy in 1973 when it almost lost the Yom Kippur War to Egyptian and Syrian forces that it had handily defeated just 6 years before. The Israelis were caught off guard by new antitank and antiaircraft missiles supplied by the Soviet Union—a taste of what the information age had in store. In hindsight, the ability of the Egyptians and Syrians to bounce back from their humiliation in the Six-Day War should not have been so surprising. Defeat has often been a spur to innovation, from the Prussians' humiliation in the Napoleonic wars, to the German humiliation in World War I, to the American humiliation in Vietnam. In the case of Japan in 1853, it did not take actual defeat but the mere threat of it, made explicit by the arrival of Commodore Matthew Perry's "black ships," to catalyze wide-ranging reforms. Out of all these setbacks were born new ways of fighting that led once-vanquished forces to victory on future battlefields.

It is much less common to see dominant powers innovating. More typical is the case of the Ottoman Empire, which mastered only one major military revolution—gunpowder—and then only in its early years. In their heyday in the 15th and 16th centuries, the Turks' gun-wielding armies and fleets carved out and defended a vast empire encompassing Asia Minor, North Africa, and the Balkans. By the 18th century, however, their glorious record of martial triumphs had become a major obstacle to making the innovations

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RECALL

necessary to keep up with European competitors. The Sublime Porte's modernization was so belated and half-hearted that by the 19th century, the onetime scourge of Christendom had become known as the "Sick Man of Europe." Early success set up the Turks, as so many others, for later defeat.

Uncontrollable Creativity

History does not offer a blueprint of how the process of military innovation occurs. There is no single model that covers all cases. As James Q. Wilson notes:

Not only do innovations differ so greatly in character that trying to find one theory to explain them all is like trying to find one medical theory to explain all diseases, but innovations are so heavily dependent on executive interests and beliefs as to make the chance appearance of a change-oriented personality enormously important in explaining change. It is not easy to build a useful social science theory out of "chance appearances."[1]

To the limited extent that we can generalize about 500 years of history, it seems fair to say that the most radical innovations come from outside of formal military structures. There are recent exceptions, such as the atomic bomb, satellite, and stealth airplane, but most of the key inventions that changed the face of battle since the Middle Ages were the products of individual inventors operating more or less on their own, geniuses such as Robert Fulton, Hiram Maxim, Johann Nikolaus von Dreyse, and Guglielmo Marconi. Some had military applications in mind; most did not. For instance, the casting techniques that made cannons more effective in the 15th century were originally developed to make church bells.

Dissemination and Nullification

Moreover, few if any technologies, much less scientific concepts, will remain the property of one country for long. France matched the Prussian needle gun less than 4 years after the battle of Königgrätz; Germany matched the British *Dreadnought* 2 years after its unveiling; the Soviet Union matched the U.S. atomic bomb 4 years after Hiroshima and Nagasaki. It is a truism that new technology, if effective, tends to disseminate quickly.

B–52G Stratofortress bombers are prepared for mission, Operation Desert Storm

U.S. Air Force (Donald McMichael)

U.S. 8th Air Force bomber over Focke Wulf plant at Marienburg, Germany

DOD

One exception is that technology was slow to move from the West to the rest of the world in the latter years of the gunpowder age and during the first industrial age—from about 1700 to 1900. This created a yawning imbalance of power, which allowed Europeans to conquer much of the world on the cheap. But by the mid-20th century, the balance had righted itself, and Asians and Africans in possession of modern weaponry were able to win their independence from European states weakened by two world wars and the collapse of assumptions of racial superiority. Some analysts may discount the importance of technology in determining the outcomes of battles,[2] but there is no getting around the central importance of advanced weaponry in the rise of the West.

The process of technological dissemination and nullification has speeded up since the rise in the mid-19th century of such major arms manufacturers as Krupp, Winchester, and Armstrong, which were happy to sell to just about anyone. Thus, German troops were killed during the Boxer Rebellion in 1900 by Chinese soldiers firing Mauser rifles and Krupp artillery pieces.[3] Contemporary arms manufacturers, such as Lockheed Martin, Northrop Grumman, and the European Aeronautic Defence and Space Company, operate under greater export restrictions but still seek to market the latest technology around the world.

Even more pervasive today are firms that sell dual-use devices such as computers, night-vision goggles, and global positioning system trackers that have military and civil applications. Thanks to their success, many of America's key information age advantages are rapidly passing into the hands of friends and foes alike. This is part of a longer-term trend: the Westernization of the world, which increasingly puts the peoples of Asia, the Americas, and Africa on a par, economically as well as militarily, with those of Europe.

As important as technological nullification is psychological nullification. The first

time an army faces a major new weapon—the needle gun at Königgrätz, the machinegun at Omdurman, the tank in Poland and France, the smart bomb in the Gulf War—it is likely to be caught off guard. The resulting panic can be as damaging as the physical effects of the weapon. The next time, however, the other side is likely to be less impressed. Thus, the coalition bombing campaign of Iraq in 2003 did not induce the same "shock and awe" as its predecessor in 1991. Having been bombed more or less continuously for a decade, Iraqis had become inured to the effect of precision munitions. The speed and ferocity of the U.S. armored advance, by contrast, came as a surprise.

the coalition bombing of Iraq in 2003 did not induce the same "shock and awe" as its predecessor in 1991

The way to gain a military advantage, therefore, is not necessarily to be the first to produce a new tool or weapon. It is to figure out better than anyone else how to utilize a widely available tool or weapon.

Strategy and Innovation

Culture, geography, politics, and other factors greatly affect how receptive a military is to proposed changes. Especially important is a country's strategic situation—a combination of its location, fears, and ambitions. Geography is not destiny, or else it would be impossible to explain why Britain was a naval power for centuries while Japan—another island nation off the coast of a major continent—was not. Or why Prussia, rather than another nearby state such as Saxony or Bavaria, became a great power starting in the 18th century. Or why Sweden rose from obscurity to prominence in the 17th century and then fell back into obscurity in the 18th century—all without changing its geographic position. But even though it is only one factor among many, geography has clearly influenced which nations are more receptive to which military revolutions.

Germany, for instance, became a leader in utilizing Panzers because it planned to fight a fast-moving land war against numerous enemies on its frontiers. The Nazis did nothing to develop aircraft carriers or four-engine bombers because they did not think they needed them against their continental rivals. The United States was the mirror image: it led the way in the development of long-range bombers and aircraft carriers because it expected to fight a naval and air war against enemies far removed from its borders, but it did little to develop tank units because it did not expect to fight a major land war. Such expectations may turn out to be ill founded (Germany could have used B–17s; the United States could have used Tiger tanks), but they powerfully affect the decisions made about allocating scarce resources.

It helps to have relatively few scenarios to prepare for. Germany in the interwar years had the luxury of preparing only for a land war in Europe, whereas Britain had to prepare not only for that contingency but also for naval wars in the Atlantic and Pacific, as well as for imperial policing in its colonies. The United States had the advantage of focusing on a single foe after the Vietnam War. The concepts and technologies created to fight the Red Army just happened to be perfectly suited to battling the Iraqi army.

Today, the Nation faces a much bigger challenge because it has many potential foes, ranging from nonstate actors (al Qaeda and its ilk) to medium-sized powers (Iran, North Korea, and Syria) and a rising great power (China). Because America has chosen to be strong in every sphere of combat (land, sea, air, space, and cyberspace), in every type of warfare (from peacekeeping to high-intensity conflict), and in every corner of the globe, it faces pressure to invest and innovate in many fields at once, or else to rein in its ambitions.

A Democratic Advantage?

Western states have been the most successful military innovators over the past 500 years. There was something about Western Europe (and its overseas offspring) that made it much more dynamic and open to change than other civilizations. Having a relatively liberal political and intellectual climate helps create an atmosphere in which innovation can flourish. The Soviet Union's lack of freedom ultimately sabotaged its attempts to keep pace in the information age, just as the lack of freedom in Spain and France made it difficult for them to keep pace in a naval arms race with first the Netherlands and then Britain.

But we should be wary of simple-minded democratic triumphalism. History has offered many examples of autocratic states that proved more adept than their democratic rivals at exploiting military revolutions. The success of the Prussian/German armed forces between 1864 and 1942 and the Japanese between 1895 and 1942 shows how well even autocratic systems can innovate. All that is required is some openness to change, a commitment to meritocracy, and an ability to examine one's own mistakes critically—all disciplines in which the illiberal German general staff excelled. In fact, most democracies, which tend to be less militaristic than autocracies, face a disadvantage in capitalizing on military innovations because they are less generous to their armed forces in peacetime, a problem that plagued all Western nations during the 1930s.[4]

Nor is there much evidence that soldiers fight better for a democracy than for a dictatorship.[5] Man for man, the *Wehrmacht* was probably the most formidable fighting force in the world until at least 1943, if not later. German soldiers were even known for showing more initiative than those of democratic France, Britain, and America.[6] Meanwhile, Soviet troops stoically endured privations and casualties far beyond anything suffered by their Western allies. North Vietnam is another modern state that fielded superb armies despite a notable democracy deficit. In any case, the differences between the armies of dictatorships and those of democracies are less significant than they may appear at first blush. Even the most liberal states must employ command-and-control methods, and even the most autocratic must pay attention to troop morale and allow for individual initiative.[7]

But if democracies do not have an advantage in creating formidable war machines, they seem to have an intrinsic edge in figuring out how to use them. Autocracies tend to run amok because of a lack of internal checks and balances. Philip II, Gustavus Adolphus, Louis XIV, Frederick the Great, Napoleon, Wilhelm II, Adolf Hitler, and the Japanese leaders of the early 20th century all built superb militaries but led their nations into ruinous wars. (So did Saddam Hussein with his less impressive but nevertheless formidable army.) These autocrats had no sense of limits, and no other politician was strong enough to stop them. Their tactics may have been superb, but their grand strategy was poor, the best examples being Napoleon's and Hitler's foolhardy invasions of Russia. Democracies sometimes overreach too (witness the Boer, Algerian, and Vietnam wars), but they tend to avoid the worst traps because they have a more consensual style of decisionmaking.

Building Better Bureaucracies

The key to successful innovation, whether for a dictatorship or a democracy, is having an effective bureaucracy. America's secret weapon today is not the stealth airplane or the Predator, but the agency that was responsible for their development (and much else), the Defense Advanced Research Projects Agency (DARPA). Ever since its forerunner was set up during the Sputnik crisis in 1958, DARPA has shown how a government agency can push the frontiers of innovation by allocating grants to universities, think tanks, and private companies for high-risk ventures.

To the limited extent that innovation can be systematized, DARPA has done it. Other nations trying to compete with America are hobbled by not spending as much as the agency does on research and development. But spending is not enough. If it were, the European Union, whose collective defense budget is two-thirds the size of America's and which has more soldiers under arms, would be closer to the United States in military capabilities. The problem is that most European spending is unfocused, duplicative, and inefficient, whereas DARPA has been smart about allocating its $2 billion annual budget.

In lieu of the right bureaucratic structures, the possession of modern weaponry is of dubious utility, as states from 18th-century India to the 20th-century Middle East have found out. The Arab nations are particularly egregious in this regard: their record of military futility since 1945 comes despite having access to copious stocks of modern arms from such suppliers as France and the Soviet Union. No matter how great the Arab preponderance in men and materiel has been—against Israel in 1948, 1956, 1967, and 1973, their advantage appeared, on paper at least, to be insuperable—they have continuously contrived to snatch defeat from the jaws of victory. In one of the lesser-known episodes of this long record of ignominy, the well-armed Libyan military was routed by ill-armed Chadians in 1986–1987 after Muammar Qadhafi tried to annex northern Chad.[8] The only military strategies (if they are such) that Arabs have been able to employ with any success are terrorism and repression.

It is no surprise that the authoritarian Arab states have not, for the most part, managed to make the changes necessary to harness modern military power. No Arab dictator can afford to have a military that is too strong for fear that it will be employed against him. But even for more liberal polities, which generally need not fear a military coup d'etat (though France faced such a prospect as recently as the early 1960s), transitions from one military system to another can be wrenching, because they require uprooting existing career patterns and deeply held belief systems. Officers trained in cavalry charges were not happy about the advent of tanks, any more than sailors trained in battleships were happy about the arrival of aircraft carriers, or knights trained in sword-fighting were happy about the spread of firearms. Militaries are inherently conservative. As a British colonel noted in 1839, "In no profession is the dread of innovation so great as in the army."[9]

This fear is part of a broader challenge confronting all information age militaries: how to make room for those who fight with a computer mouse, not an M–16. Will traditional warriors continue to run things, or will nerds with bad posture and long hair, possibly even women, assume greater prominence? Two Chinese strategists write that "it is likely that a pasty-faced scholar wearing thick eyeglasses is better suited to be a modern soldier than is a strong young lowbrow with bulging biceps."[10] But even if that is true, reordering any military along those lines presents a far more profound and problematic challenge than questions about which tank or helicopter to buy.

senior leaders believed that future warfare lay in high-tech information systems, not in lowly infantrymen

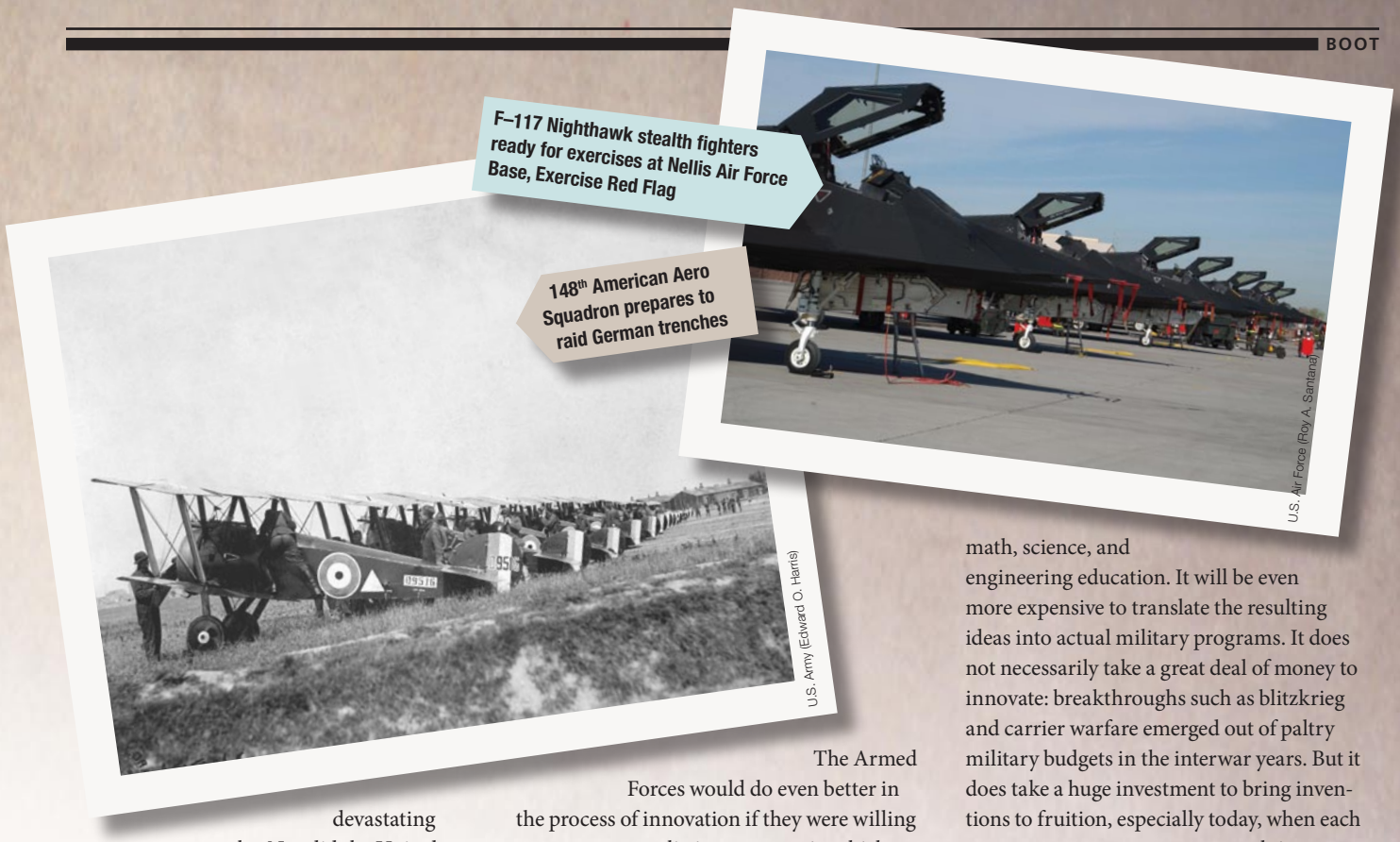
Too Much Change—and Too Little

Those armed forces that did not successfully integrate the gun, the long-range bomber, precision-guided munitions, or other important innovations experienced the agony of their members dying in great numbers. But there are also instances of militaries too eager to change in the wrong way. In the 1930s, the U.S. Army Air Corps and the Royal Air Force placed too much faith in the ability of unescorted bombers to win a future war—a doctrinal mistake that cost tens of thousands of air crews over Europe. In the 1940s, Hitler poured vast resources into the development of the V–1 and V–2 rockets that might better have been employed on conventional forces. And in the 1950s, the U.S. Army, Navy, and Air Force did so much to rearrange themselves around the demands of the nuclear battlefield that they were not ready for the actual threat they wound up confronting in the jungles of Vietnam.

Arguably, a similar phenomenon has occurred in Iraq, where the information-age U.S. military has become frustrated by less sophisticated adversaries. Many now ask: Why did the Defense Department not invest in more linguists, military police, civil affairs specialists, and Soldiers in general? The answer is that senior leaders believed that future warfare lay in high-tech information systems, not in lowly infantrymen. This appears to be a mistake in light of events in Iraq—but it may not turn out to be so mistaken if the United States finds itself in a clash with China or North Korea.

There is no rule of thumb to suggest how much or how little a military should change in response to technological developments. Each revolution raises painful questions of prioritization such as those the United States and other countries confront today. Should they pay for more traditional infantrymen, or push resources into "transformational" programs such as surveillance satellites, wireless broadband networks, and directed-energy weapons? Should they continue to build traditional tanks, aircraft, and ships or switch to unmanned platforms? Each path has risks and tradeoffs. Paying for larger standing forces can make it easier to respond to today's threats; cutting force strength and using the savings to pay for high-tech hardware can make it easier to respond to tomorrow's threats. It would be nice to be able to do everything at once. But no one, including the Pentagon, has enough money for that.

History indicates that the wisest course is to feel one's way along with careful study, radical experimentation, and free-wheeling wargames. Paradoxically, revolutionary transformation often can be achieved in evolutionary increments.[11] The Germans did not shift their entire army to Panzer divisions in the interwar years. In 1939–1940, only about 10 percent of German forces were composed of armored units, and the *Wehrmacht* had more ponies than Panzers, but this was enough to produce breakthroughs from Poland to France. Likewise, British Field Marshal H.H. Kitchener did not have many machineguns when he confronted Sudanese jihadists at Omdurman, but the few he had produced



devastating results. Nor did the United States convert its entire air force to stealth aircraft in the 1980s, but even a few F–117s had an outsized impact on the Gulf War. A little cutting-edge technology can go a long way against a less advanced foe.[12]

This offers a counterpoint to skeptics who deny the existence of an information revolution simply because not everything has changed. It never does. On the other hand, this also offers a cautionary lesson that some modern-day J.F.C. Fullers or Billy Mitchells anxious to scrap the tank, aircraft carrier, and manned airplane should keep in mind: introducing transformational systems does not necessarily mean getting rid of all legacy platforms. Rather, it means readjusting the balance between the two. "You need to think about how to make a transition," counsels Andrew Marshall of the Pentagon's Office of Net Assessment, "not about how to eliminate current weapons."[13]

While no one would wish for more combat, the Armed Forces are helped by having many wars to fight that can serve as field laboratories for testing new technologies. The first Predator was rushed into service for the Kosovo conflict. Having performed well there, an armed version made its debut 2 years later in Afghanistan. That, in turn, spurred the development of purpose-built unmanned combat aerial vehicles that will no doubt soon be tried in another conflict.

The Armed Forces would do even better in the process of innovation if they were willing to stage more realistic wargames in which adversaries could use unconventional tactics instead of fighting the way American generals and admirals prefer.[14] They would also be helped if defense spending could be allocated according to a rational judgment of strategic priorities, not based on the political muscle of major defense contractors and their allies on Capitol Hill. That, however, seems unlikely to change as long as America remains a democracy.

Silent Sputnik?

Many experts note that U.S. hegemony might be endangered by the Nation's failure to produce more math, science, and engineering graduates.[15] The United States has made up for this shortfall in the past by importing smart people from abroad (38 percent of those holding doctorates in science and engineering are foreign-born).[16] But that has become harder in the wake of post-9/11 visa restrictions[17] and booming economies in China, India, South Korea, and Taiwan, all major sources of American scientific and engineering talent who discourage immigration. If China can keep more of its geniuses at home, it will be easier for Beijing to challenge U.S. power. Some scientists warn that the United States is facing a "silent Sputnik" crisis that could imperil its leadership.[18]

Remedying this looming shortfall will probably require more funding for math, science, and engineering education. It will be even more expensive to translate the resulting ideas into actual military programs. It does not necessarily take a great deal of money to innovate: breakthroughs such as blitzkrieg and carrier warfare emerged out of paltry military budgets in the interwar years. But it does take a huge investment to bring inventions to fruition, especially today, when each new weapons system costs several times more than its predecessor. It also costs a lot to field high-quality Soldiers able to cope with the complexity of modern war. The annual cost for each member of the U.S. Armed Forces more than doubled in constant terms over the past 30 years—from $125,000 per person in 1970 to $264,000 in 2003.[19]

Despite the fervent hopes of some transformation advocates, there is no way to increase military power significantly while cutting costs. Today, even more than in the 15th century, more military capability requires "money, more money, and again more money."[20] With America facing budget deficits and looming bills for social welfare programs, questions inevitably arise about whether it can afford to keep spending so much on defense. Or should it rely on its economic and cultural "soft power"?

Why RMAs Matter

History is driven by many factors, but in academia's rush to focus on economics, race, class, sexuality, geography, germs, culture, or other influences, it would be foolish and short-sighted to overlook the impact of military prowess and especially aptitude in taking advantage of major shifts in warfighting. Of course, a country's success, or lack thereof, in harnessing change cannot be divorced from such underlying factors as its economic health, scientific sophistication, educational

system, or political stability. But, contrary to Napoleon's belief, God is not necessarily "on the side of the big battalions."[21] Even large and wealthy countries often lose wars and head into long-term decline through a lack of military skill.

Indeed, while some states translate riches into military power, as America did in the early 20th century, other states have translated military power into riches, as when England sent its navy to conquer colonies and carve out trade routes and Prussia sent its army to overrun neighboring German principalities. Some states are drained by war, but many attain Gustavus Adolphus' ideal of making war "pay for itself"—a feat achieved most recently by the United States when it succeeded in making its allies foot most of the bill for liberating Kuwait in 1991.

The ongoing proliferation of destructive technology means that the link between economic and military power is more tenuous than ever. Al Qaeda, whose entire budget could not buy a single F–22, can inflict devastating damage on the world's richest country. Advances in biological warfare and cyberwar promise to put even more destructive potential into the hands of ever smaller groups—as does the continued proliferation of nuclear weapons.

Imagine the devastating consequences of a megaterrorist attack. Not only could millions die but international travel and commerce—the lifeblood of the global economy—could be severely disrupted as well. Such a scenario reveals the falsity of economic determinist arguments, which counsel that military strength is unimportant and that it is feasible to stint on military preparedness in order to strengthen the economy. On the contrary, there can be no long-term prosperity without security. The entire world today depends, no matter how begrudgingly or unwittingly, on the protection provided by the United States, whose military keeps air and sea lines open, safeguards energy supplies, and deters most cross-border aggression.

Dreamers can convince themselves that military power no longer matters, that economic interdependence has consigned war to the dustbin of history, and that a country need only wield soft power, but history has delivered a stark rebuke to such wishful thinking. The attacks of September 11, 2001, put an end to a decade of talk about the "end of history," a "strategic pause," the inexorable flow of "globalization," and the "peace dividend." The incidence of war may have declined for the moment, but great dangers still loom. Santayana had it right: "Only the dead have seen the end of war."[22]

Fighting Wildcats and Rodents

Technological advance will not change the essential nature of war. Fighting will never be an antiseptic engineering exercise. It will always be a bloody business subject to chance and uncertainty in which the will of one nation or subnational group will be pitted against another, and the winner will be the one that can inflict and absorb more punishment than the other side. But the *way* punishment gets inflicted has been changing for 500 years, and it will continue to change in strange and unpredictable ways.

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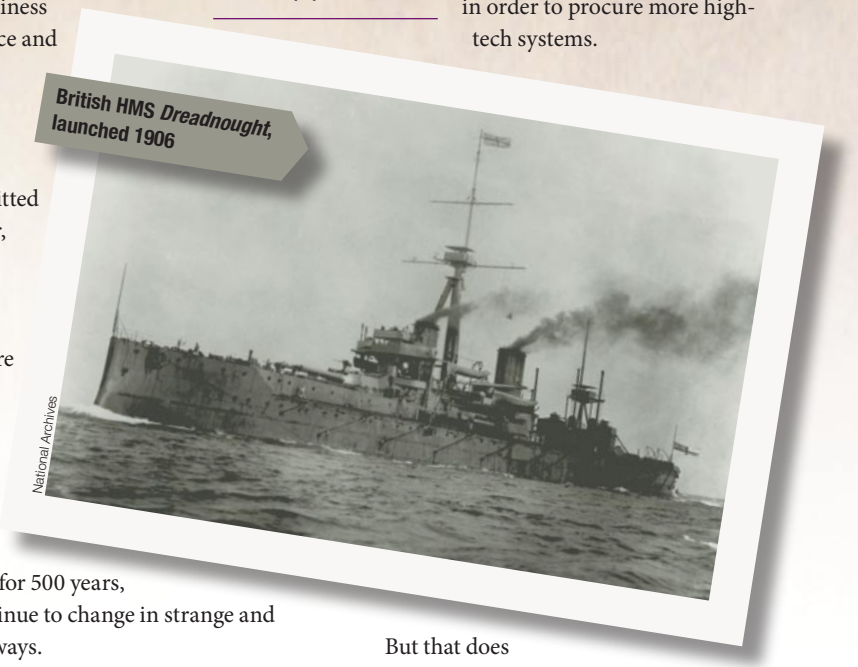

British HMS *Dreadnought*, launched 1906

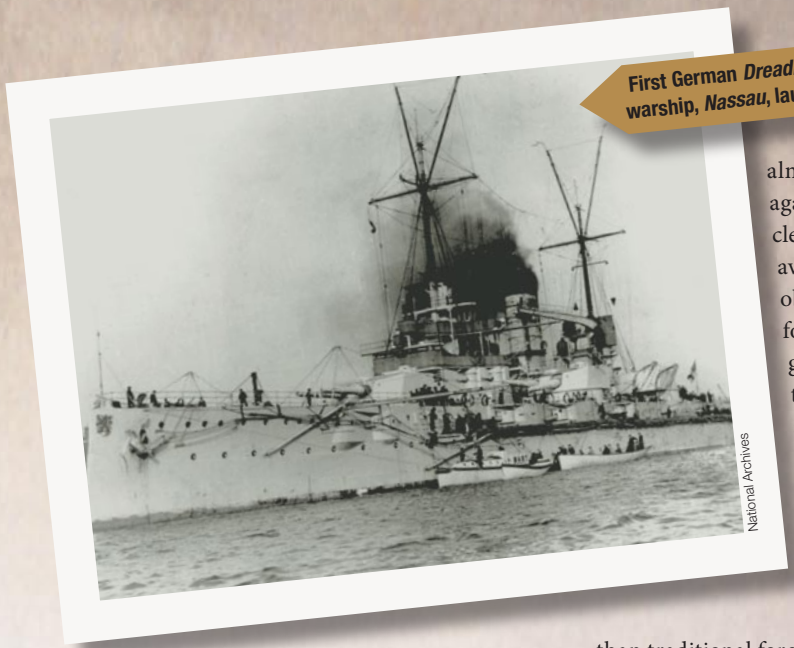
National Archives

In assessing the future conduct of conflict, most analysts fall into one of two camps. One stresses the dangers of terrorists and guerrillas who use cheap, simple weapons such as the AK–47, machete, or explosives. The other stresses the danger of high-tech weapons such as cruise missiles and killer satellites proliferating around the world and into the hands of states such as China and North Korea. The former school (associated with ground-combat arms) underscores the need for better warriors, the latter school (associated with air and naval forces) the need for better machines. The reality is that both high- and low-intensity threats are real and that more superlative people as well as first-rate equipment are needed to counter them.

Today, the United States is much further along in figuring out how to tame the Republican Guard than al Qaeda, and it needs to place more emphasis on making up for its deficiencies in irregular warfare rather than simply enhancing its already substantial lead in conventional warfare. While the information revolution has decreased the number of weapons and soldiers needed to defeat a conventional adversary, occupation duty and nation-building—the prerequisites for turning a battlefield triumph into a long-term political victory—continue to demand lots of old-fashioned infantry. Therefore, the United States and its allies would be mistaken to seriously stint on force size in order to procure more high-tech systems.

But that does not mean that America can simply ignore the dangers of major warfighting or the dictates of technological change. That was the mistake Britain made before 1914 and again before 1939. The British had the world's best "small war" force—an army well trained and equipped for fighting bandits and guerrillas—but it was ludicrously insufficient to deter German aggression or defeat Germany once a world war broke out. That mistake, symbolized by deficiencies in tanks and aircraft carriers, hastened the end of Pax Britannica.

Today, the possibility of conventional interstate war is lower than at any time in 500 years, but it has not disappeared altogether. Because Americans and other citizens of Western democracies no longer seem willing to suffer the same level of casualties experienced by their ancestors, their militaries must be able to defeat adversaries at scant cost in lives. That argues for keeping the qualitative edge that America gained in the information age, an edge that cannot be preserved by standing still. It will be necessary to keep



innovating since some of the technologies and techniques employed by the United States are starting to be negated by their dissemination around the world. Innovation must be organizational as much as technological, and it needs to focus on potential threats across the entire spectrum, from low-intensity guerrilla wars to high-intensity conventional conflicts.

In any case, the boundaries between conventional and unconventional, regular and irregular warfare are blurring. Even nonstate groups are increasingly gaining access to the kinds of weapons that were once the exclusive preserve of states. And even states will increasingly turn to unconventional strategies to blunt the impact of American power.

Two colonels of the Chinese People's Liberation Army envision "unrestricted warfare" encompassing not only traditional force-on-force encounters but also financial warfare (subverting banking systems and stock markets), drug warfare (attacking the fabric of society by flooding it with illicit drugs), international law warfare (blocking enemy actions using multinational organizations), resource warfare (seizing control of vital natural resources), and even ecological warfare (creating manmade earthquakes, tsunamis, or other disasters).[23] In a clever bit of jujitsu, many of these strategies turn the strengths of information age countries against the countries themselves. Al Qaeda is pursuing similar strategies.

Countering such threats will require much more than simply buying increasingly advanced aircraft, tanks, and submarines. Such traditional weapons systems may be almost useless against adversaries clever enough to avoid presenting obvious targets for precision-guided munitions. To fight and win future wars, which may resemble a series of terrorist attacks or hit-and-run raids more than traditional force-on-force armored, aerial, or naval engagements, will require reorganizing conventional militaries to emphasize such skills as cultural awareness, foreign language knowledge, information operations, civil affairs, and human intelligence. It will also require cutting away the bureaucratic fat to turn bloated industrial age hierarchies into lean information age networks capable of utilizing the full potential of high-tech weapons and highly trained soldiers.

Whether the United States is ready for such challenges will determine whether it can keep its position as the lone superpower or the world will see another power shift. The course of future history will turn on the outcome. **JFQ**

NOTES

[1] James Q. Wilson, *Bureaucracy: What Government Agencies Do and Why They Do It* (New York: Basic Books, 1989), 227; Stephen Peter Rosen, *Winning the Next War: Innovation and the Modern Military* (Ithaca: Cornell University Press, 1991), 243. Wilson agrees that "uncertainties about the enemy and about the costs and benefits of new technologies make it impossible to identify the single best route to innovation."

[2] Ralph Rotte and Christoph M. Schmidt argue that "technology is . . . a negligible factor" in determining the outcome of battles. But they base this conclusion on an analysis of a database that seems to consist mainly of battles between industrialized nations. Certainly technology was not "negligible" in determining the outcome at Omdurman or lots of other imperial clashes. See Rotte and Schmidt, *On the Production of Victory: Empirical Determinants of Battlefield Success in Modern War*, IZA Discussion Paper No. 491 (Bonn, Germany: Institute for the Study of Labor, May 2002), available at <http://ssrn.com/abstract=314204>.

[3] Geoffrey Parker, "From the House of Orange to the House of Bush: 400 Years of 'Revolutions in Military Affairs,'" in *Acta of the XXVIII*th *Congress of the International Commission of Military History*, ed. John Lynn (Chicago: McCormack Foundation, 2003).

[4] Niall Ferguson, *The Cash Nexus: Money and Power in the Modern World, 1700–2000* (New York: Basic Books, 2001), 405.

[5] Dan Reiter and Allan C. Stams III, *Democracies at War* (Princeton: Princeton University Press, 2002), 4, argue that "democracies' emphasis on individuals and their concomitant rights and privileges produces better leaders and soldiers more willing to take the initiative on the battlefield." But Risa Brooks, in "Making Military Might: Why Do States Fail and Succeed?" *International Security* 28, no. 2 (Fall 2003), 149–191, points out many flaws in their argument.

[6] See Martin van Creveld, *Fighting Power: German and U.S. Army Performance, 1939–1945* (Westport, CT: Greenwood Press, 1982); and Trevor N. Dupuy, *A Genius for War: The German Army and General Staff, 1807–1945* (Garden City, NY: Military Book Club, 2002). For a contrasting perspective, which emphasizes American combat effectiveness and German deficiencies, see Peter R. Mansoor, *The GI Offensive in Europe: The Triumph of American Infantry Divisions, 1941–1945* (Lawrence, KS: University Press of Kansas, 1999).

[7] George Orwell made this point: "Discipline, for instance, is ultimately the same in all armies. Orders have to be obeyed and enforced by punishment if necessary, the relationship of officer and man has to be the relationship of superior and inferior." See Sonia Orwell and Ian Angus, ed., *The Collected Essays, Journalism and Letters of George Orwell* (Boston: Nonpareil Books, 2000), vol. 2, *My Country Right or Left*, 1940–1943, 250. Of course, discipline and punishment are usually far harsher in the armies of authoritarian states than in those of democracies.

[8] See Kenneth M. Pollack, *Arabs at War: Military Effectiveness, 1948–1991* (Lincoln: University of Nebraska Press, 2002), 375–412.

[9] John Mitchell, quoted in Rosen, 2.

[10] Qiao Liang and Wang Ziangsui, *Unrestricted Warfare: China's Master Plan to Destroy America* (Panama City, Panama: Pan American Publishing Company, 2002), 32.

[11] Williamson Murray and MacGregor Knox, "The Future Behind Us," in *The Dynamics of Military Revolution, 1300–2050*, ed. MacGregor Knox and Williamson Murray (Cambridge: Cambridge University Press, 2001), 185, note, "The most successful organizations avoided wild leaps into the future; their innovations remained tied

to past experience, derived from conceptually sophisticated and honestly assessed experiments, and depended on the ability to learn from both success and failure."

[12] This is a point that Andrew Marshall made in an interview with the author. Bill Keller, "The Fighting Next Time," *The New York Times Magazine* (March 10, 2002), paraphrases Marshall: "He talks in terms of changing 10 to 15 percent of the force from old to new."

[13] Author interview with Andrew Marshall.

[14] Colonel T.X. Hammes, USMC (Ret.), notes, "Unfortunately, today, instead of realistic, free-play exercises, we use mostly scripted exercises with no chance of losing." See Hammes, *The Sling and the Stone: On War in the 21st Century* (St. Paul, MN: Zenith Press, 2004), 236.

[15] The Hart-Rudman Commission on U.S. National Security in the 21st Century, which issued its report on February 15, 2001, made "recapitalizing" U.S. scientific and engineering expertise its second most urgent priority. Available at <www.au.af.mil/au/awc/awcgate/nssg/phaseIIIfr.pdf>.

[16] See Adam Segal, "Is America Losing Its Edge? Innovation in a Globalized World," *Foreign Affairs* 83, no. 6 (November-December 2004).

[17] Between 2001 and 2003, the number of successful visa applicants to the United States fell from 10 million to 6.5 million. The number of temporary worker visas for science and technology jobs fell even faster. See Robert L. Paarlberg, "Knowledge as Power: Science, Military Dominance, and U.S. Security," *International Security* 29, no. 1 (Summer 2004), 146.

[18] For instance, Fareed Zakaria warns that "the foreign visa crisis," if "left unattended," is "going to have deep and lasting effects on American security and competitiveness." See Zakaria, "Rejecting the Next Bill Gates," *The Washington Post* (November 23, 2004).

[19] S.J. Deitchman, *Military Force Transformation: Progress, Costs, Benefits and Tasks Remaining* (Washington, DC: The Atlantic Council, December 2004), 6. Britain, France, and Germany continue to spend no more than what the United States spent in 1970.

[20] King Louis XII's adviser, quoted in Eugene F. Rice and Anthony Grafton, *The Foundations of Early Modern Europe, 1460–1559*, 2d ed. (New York: W.W. Norton, 1994), 118. See also, J.R. Hale, *War and Society in Renaissance Europe, 1450–1620* (Baltimore: Johns Hopkins University Press, 1985), 232.

[21] Quoted in Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle* (Princeton: Princeton University Press, 2004), 14.

[22] George Santayana, *Soliloquies in England and Later Soliloquies* (Ann Arbor: University of Michigan Press, 1967), 102.

[23] Liang and Ziangsui.

RECALL

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First Secretary of Defense Transformation Essay Contest

The September 11, 2001, attacks and the global war on terror challenge the U.S. Government, particularly the Department of Defense, to innovate and transform the way in which the Nation addresses near-term concerns while maintaining focus on long-term security challenges from a full spectrum of potential competitors.

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The purpose of this competition is to stimulate new approaches to U.S. Government transformation from a broad spectrum of civilian and military students. Essays should address U.S. Government structure, policies, capabilities, resources, and/or practices and provide creative, feasible ideas on how to transform our national security institutions.

Winning essays will be published by NDU Press as a "Special Feature" in the fourth quarter issue of *Joint Force Quarterly*. Authors of the first, second, and third place essays will be recognized by the Secretary of Defense and awarded cash prizes and certificates of recognition. If conditions permit, winners may meet with the Secretary for personal congratulations and photographs. All finalists' papers in each category will be evaluated for future publication in *JFQ*. This is a joint, interagency writing contest; papers must meet rigorous academic standards.

Competitors may write on any aspect of U.S. Government transformation—addressing the coherent employment of the political, military, economic, and informational instruments of national power to achieve strategic objectives. Essays with a joint, interagency, or integrated operations emphasis, as well as those addressing nontraditional security issues, are encouraged.

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