

The Information Revolution and Post-Modern Warfare

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Armed Conflict in the 21st Century:

ContinuedPart 4

Eric Drexler, the most fervent advocate of nanotechnology, predicts that it will unleash a transformation of society as self-replicating nanorobots manufacture any materials permitted by the laws of nature and thus help cure illness, eliminate poverty, and end pollution. As Henley points out, combining nanotechnology with molecular biology and advances in information technology could, conceivably, lead to things like biological warfare weapons that are selective in targets and are triggered only by specific signals or circumstances. It could also lead to radically decentralized sensor nets, perhaps composed of millions of microscopic airborne sensors or, at least, a mesh of very small robots as envisioned by Libicki. And, Henley contends, it might eventually be possible to incorporate living neuron networks into silicone-based computers, thus greatly augmenting their "intelligence."

Beyond technological obstacles, the potential for effective battlefield robots raises a whole series of strategic, operational, and ethical issues, particularly when or if robots change from being lifters to killers. The idea of a killing system without direct human control is frightening. Because of this, developing the "rules of engagement" for robotic warfare is likely to be extraordinarily contentious. How much autonomy should robots have to engage targets? As a robot discovers a target and makes the "decision" to engage it, what should the role of humans be? Would a human have to give the killer robot final approval to shoot? How would the deployment of battlefield robots affect the ability of the U.S. military to operate in coalition with allies who do not have them (given that a roboticised force is likely to take much lower casualties than a non-roboticised one)? Should the United States attempt to control the proliferation of military robotic technology? Is this feasible since most of the evolution of robotic technology, like information technology in general, will take place in the private sector? Should a fully roboticised force be the ultimate objective?

Other emerging technologies could prove equally revolutionary. One example is what can be called "psychotechnology." Future military commanders might have the technology to alter the beliefs, perceptions, and feelings of enemies. This could range from things like "morphing" an enemy leader and creating a television broadcast in which he surrenders to much more frightening ideas like perception-altering implants, chemicals, or beams of some sort. Such technologies would be particularly ominous from an ethical perspective. Today, effective and controllable psychotechnology is science fiction, but so too was space flight not so long ago. Any developments in this realm warrant very close scrutiny. Barring some sort of truly fundamental change in the global security environment, they should be eschewed.

PART III:
THE MARK OF SUCCESS

FOR FUTURE MILITARIES
FOUNDATION.

The more things change, the more they stay the same. Like all clichés, this one has a core of truth, particularly for of armed conflict. Colin Gray reminds us, more about strategy is persistent, even eternal, than is changeable. Even in revolutionary times, continuity outweighs change. This holds true for the current revolution in military affairs. No matter how much technology, operational methods, or military organizations shift (or appear to shift), war will always involve, as Clausewitz noted, a dangerous and dynamic relationship among passion, hatred, reason, chance and probability.

The best that military commanders and strategists can hope for is to hold passion in check with rationality, and to minimize the deleterious effects of chance and probability through planning, training, and, to an extent, technological aids. One can only prepare for chance through redundancy, fallback positions, and “Plan B.” Passion injects even more conundrums, particularly in informal war where its depths can be difficult for those not intimate with the conflict. For some reason, humans find it easier to accept simple bad luck than blind hatred.

The “specialness” of warfighting and warriors will survive any real or apparent changes in the nature of armed conflict. War is and will be distinct from other types of human activity. Largely because of this, future warriors, at least in democracies like the United States, will continue to be bound by an ethos stressing duty, honour, sacrifice, and the highest ethical standards. Sometimes their enemies will not share this. This ethical asymmetry is likely to be significant. In future armed conflict as in past warfighting, quality will continue to trump quantity to a large extent. What will change, though, is the definition of quality. It will expand and take on new, important meanings. But this is not surprising: the expansion of concepts and definitions is perhaps the most pervasive change of all in the current revolution in military affairs.

SPEED.

One of the most important determinants of success for 21st century militaries will be the extent to which they are faster than their opponents. Increased speed is a defining element of the current revolution in military affairs (and of the information revolution and the revolution in business affairs, for that matter). Armed forces that can move and make decisions rapidly will have inherent advantages. Tactical and operational speed comes from information technology—the “digitised” force—and appropriate doctrine and training.

It allows a military to surprise its enemy, to maximize its own advantages and minimize those of the opponent, and to remain dispersed as long as possible (which will be vital in the lethal battlefields of the 21st century thick with precision guided munitions and weapons of mass destruction). A military with tactical and operational speed will be able to “pulse” its activities, concentrating and dispersing in rapid sequence. Just as there are specific frequencies at which a pulsed strobe light is most unsettling to those exposed to it, it is likely that there are psychologically optimal frequencies for pulsed military operations.

Strategic speed will be equally important as a determinant of success in future armed conflict. For nations that undertake long-range power projection, strategic speed includes mobility into and within a theatre of military operations. In the broadest sense, this entails making a lighter, more transportable military force. A number of technologies show promise in this arena, from relatively simple steps like replacing heavy materials in military equipment with lighter ones—from steel to carbon fibre or woven metal, for instance—to more complex ones like eventually moving away from petroleum based fuels and kinetic ammunition, both of which are heavy and bulky. Another step that could help with strategic speed is an emphasis on modularity in all military systems. Rather than having a tank that could only be a tank, a truck that could only be a truck, etc., it would be very valuable to have a standard mobility platform, which could have task-specific modules attached to it.

Strategic speed also entails faster decision-making. One of the core dilemmas the United States is likely to face is having a military that can deploy and operate at lightening speed, while strategic and political decision-making remains a time-consuming process of consensus building. The U.S. Army is currently using the concept of “strategic preclusion” as a tool to assess long-term force development. This calls for an Army that can be deployed to a theatre to forestall imminent aggression rather than having to dislodge an aggressor that has already seized the territory of American friend or ally. But this concept assumes that a future American president will use military force very early in a crisis before other options have been exhausted.

The American political decision making process simply does not work that quickly. Consensus building, particularly when it involves the use of force, takes time. This problem is even worse for decision-making in alliances like NATO where each participant must undertake national decision-making prior to collective action. This is not always bad thing. A consensus decision is often better than an imposed one, particularly in any a system where the rank and file have both some degree of power and access to information. Protraction, though, brings risk.

In coming decades, interconnectedness plus the dispersion of power and information will make the need for consensus decision-making even more important. States will have to justify the use of armed force. The problem is balancing the time consuming nature of consensus decision-making with the speed of military operations. The ability to launch quick, perhaps even pre-emptive military operations will be one of the advantages which postmodern militaries will have over less advanced adversaries. But the states which have the potential to build postmodern militaries will be precisely those with the greatest need for consensus decision-making. This will be an enduring, perhaps even defining dilemma for advanced states.

While decision-making speed may not be decisive in future armed conflict, it will be a factor, with some advantages going to those entities that can reach a decision quickly. This suggests an advantage of sorts for postmodern non-state actors, which often will have more streamlined means for decision-making. Often armed conflict between a postmodern state military and a postmodern non-state actor will be one where the aggregate resources of the state are used to counterbalance the flexibility and adaptability of the non-state actors. In such cases, the ultimate outcome will often be contingent on the willingness of the state to bear the costs of the conflict.

Speed also has an even broader, “meta-strategic” meaning. The militaries which meet with the greatest success in future armed conflict will be those which can undertake rapid organizational and conceptual adaptation. In existing militaries, with their bureaucratic and hierarchical organizations, change is slow, often glacial. It can take decades to develop and field new systems, concepts, or methods. Some of the enemies of the future, particularly networked opponents using informal and grey area war will adapt rapidly. In some cases, this may compensate for quantitative shortcomings. To respond, successful state militaries must institutionalise procedures for what might be called “strategic entrepreneurship”—the ability to rapidly identify and understand significant changes in the strategic environment and form appropriate organizations and concepts.

Information technology will help. By allowing intricate, cross-cutting, and broad band communication across components of the military, information technology will speed up the adaptation process. But this is not enough. The institutional cultures of successful militaries will shift toward greater creativity and flexibility and away from a debilitating degree of risk aversion. This will have far-ranging effects on recruitment, leader development, promotion, and education. Military schools like staff and war colleges will be particularly vital. As in the past, victory or defeat in future armed conflict will be rooted in events that took place years earlier in military classrooms.

PRECISION.

It is often said that the American military of the future must be “more lethal.” But lethality is only part of future success. In fact, the future American military must be able to operate with greater precision. In one sense, this is not a new idea. Most analysis of the current revolution in military affairs stresses precision. George and Meredith Friedman, for instance, rank the development of precision guided munitions along with the introduction of firearms, the phalanx, and the chariot as “a defining moment in human history.” But despite the attention given to precision, the architects and analysts of the revolution in military affairs have taken too narrow an approach to it. Like speed, precision has multiple facets and dimensions.

So far thinking on the revolution in military affairs has focused on what might be called physical precision—the ability to hit targets with great accuracy from great distances with precisely the desired physical effect. Physical precision is derived from improved intelligence, guidance systems and, increasingly, from the ability to adjust or “tune” the effects that a particular weapon has. A proposed electro-magnetic gun, for instance, could be adjusted from a non-lethal setting to an extremely lethal one. But there is more to precision than simply hitting the right target. Military strategists and commanders must come to think in terms of psychological precision as well.

Psychological precision means shaping a military operation so as to attain the desired attitudes, beliefs, and perceptions on the part of both the enemy and other observers, whether non-combatants in the area of operations or global audiences. Like so much of the revolution in military affairs, this is a new variant of an old idea. Military thinkers have long understood that war is integrally, perhaps even essentially psychological. Sun Tzu, of course, crafted the quintessentially psychological approach to strategy, contending that “all warfare is based on deception.”

While some disciples of Clausewitz, particularly German military strategists, acted with disregard for the psychological dimension of strategy, the Prussian theorist himself clearly understood that war was a psychological struggle and the objective is to break the enemy’s will. Today the American military is not as strong at psychological precision as it should be, in part because technological advantages appear to make psychological effectiveness unnecessary.

The explanation, though, runs even deeper than that. For a nation composed of many cultures, the United States has never had a deep understanding of other cultures, perhaps because it was never a major colonial power. This has shown up whenever the U.S. military is engaged in cross-cultural conflict. Often American strategists “mirror image” the enemy and build their campaigns based on what they feel would cause Americans to surrender without taking into account the psychological differences between antagonists.

When the enemy does not react to conditions the way that Americans would, he is labeled “irrational.” The American experience with counterinsurgency offers many illustrations: astute thinkers like Edward Lansdale and John Paul Vann who understood it were often ignored. But just as modern corporations are finding that they can no longer afford the inefficiencies of their industrial predecessors, postmodern militaries must extract every possible degree of precision, psychological and well as physical. In fact, so much of 21st century armed conflict will be cross-cultural and played out in the full glare of global scrutiny that psychological precision might be the more important variant. How might future militaries attain greater psychological precision?

To some extent, technology can help. It is vital to have a very wide range of military capabilities—a “rheostatic” capability—to assure that an operation has the desired psychological affect. This suggests a growing need for effective non-lethal weapons, particularly in instances where the

psychological objective is to demonstrate the futility of opposition without killing so many of the enemy or non-combatants that the enemy's will is steeled rather than broken or that public opposition is mobilized. Some advocates of non-lethal weapons go so far as to see them as the central element in future armed conflict. This is probably an overstatement; they will be an integral tool for attaining psychological precision and sustaining the political utility of force. Different forms of psychotechnology might allow greater psychological precision.

Conceivably, technology might be developed that would give militaries the ability to alter the perceptions of targets, perhaps causing intense fear, calm, or whatever reaction was required. But any state with the capability and inclination to develop such technology should be extraordinarily careful because of the potential for violations of basic human rights. In the vast majority of cases, technology for psychological manipulation should be eschewed. Some state or organization unbound by ethical and legal constraints, though, eventually may field psychotechnology. Then the United States will have to decide whether to respond in kind or seek other means of defence. The potential for a psychotechnology arms race is real.

Technology, though, is only part of psychological precision. There is a vast body of psychological analysis, particularly that dealing with anxiety and fear, which is not adequately integrated into military planning. When the goal is to create fear and anxiety or collapse the will of an enemy, the operation should be phased and shaped for maximum psychological impact. Successful militaries must take steps to assure that operational and strategic planning staffs are psychologically astute, whether by educating the planners themselves or using information technology to provide access to psychologists, cultural psychologists, and members of other cultures. They should undertake cross cultural psychological studies aimed at building data bases and models which can help guide operational planning.

Precision has a strategic component, which is sometimes overlooked. Strategic precision entails shaping a military so that it best reflects its nation's strategic situation, including strategic culture, level of technological development, and most significant threats. For the U.S. military, this entails finding the appropriate balance among capabilities to deal with formal war, informal war, and grey area war. It also entails reaching a degree of privatisation, which maximizes efficiency without creating unacceptable risks. In attaining strategic precision, past success can be a hindrance. As Edward Luttwak points out, the paradoxical logic of strategy often makes victory the midwife of defeat. Militaries that have won great victories resist change, even when the methods and structures that brought them success grow obsolete. Victory limits the urge to adapt and innovate. For the United States, avoiding a victory-induced slumber will be a key step toward a postmodern military.

Strategic precision will also entail the ability to identify the key strategic thresholds. Nonlethal weapons and strategic information warfare will cause the threshold for the acceptable use of force to be redrawn. In the old security system, states and even non-state actors knew when force was considered appropriate. At times they deemed the costs and risks of ignoring this worthwhile, but usually formed their strategies with the threshold in sight. But non-lethal weapons and strategic information warfare will increasingly blur this threshold. It will be some time before strategists can re-establish it.

Further up the scale, the proliferation of weapons of mass destruction and globalisation are elevating the threshold at which states will be willing to undertake the costs and risks of large-scale conventional war, leading them toward less provocative (and less effective) methods such as limited strikes, proxy violence, or information warfare. Eventually, the maturation of miniaturized robots may force an additional redefinition of thresholds as states that have such technology decide when and how it should be used. States that develop an accurate understanding of these new

thresholds—those that understand the ethical contours of their time—will be less likely to make dangerous miscalculations, and thus more successful than their less astute counterparts.

FINDING AND HIDING.

In an age of precision-guided munitions, what can be found usually can be destroyed. As Martin Libicki notes, conventional warfare is changing from force on force to hide-and-peek. Given this, one of the most crucial dynamics of future armed conflict will be the struggle between finding and hiding. Successful militaries will be those better at finding their enemies than their enemies are at finding them. Within the United States, the emphasis has been on the offensive part of this equation—the finding. American strategists and technologists are expending great effort and treasure to build ever more effective systems of systems linking a multiplicity of sensors, developing means for rapid data fusion, and communicating the derived knowledge to battlefield commanders.

This is certainly worthwhile: the ability to “find” will be a determinant of success in future armed conflict. Hiding, though, warrants more attention. Hiding has not been ignored, particularly at the tactical level. Witness all of the effort given stealthy technology in the United States. Campaign plans usually include an appendix outlining the steps for deception and operational security. But the information revolution and interconnectedness have altered some of the basic precepts of deception. Standard works on military deception written as recently as 10 years ago are virtually obsolete.

Future military strategists must rebuild their understanding of deception and hiding, working with new information technology that allows morphing and sophisticated spoofing (including things like holographic soldiers, tanks, planes, and so forth). In particular, the notions of operational and strategic deception must be revisited. At the same time, the legal and ethical dimensions of deception need refinement. Militaries which do this before they enter armed conflict will increase their chances of success. Those which do it “on the fly” will face problems.

REORGANISING.

A revolution in military affairs requires not only new technology, but new operational concepts and organizations. The most successful future militaries will be those that undertake a “blank slate” re-evaluation of their basic concepts and organizational precepts. Organizations that represent a hybrid blend of hierarchical structures with networks, public components with private, and humans with machines await further analysis. We can borrow from the business world, but not import directly. We know that hybrid will be important, but do not yet know their shortcomings and hidden problems.

Other blank slate organizational questions also need asked. For instance, does it make sense to think of military service as a career that begins at age 18 or 21, continues for 20 or 30 years, and then stops? The dynamics of the information revolution may, in fact, force postmodern militaries to consider things like mid-career accessions in addition to contracting. Since many of the skills needed by future militaries will also be in great demand in the civilian sector, militaries might find it necessary to recruit mid-level or upper level leaders from the private sector directly into the service, and to reward them at a level equivalent to what they would attain in the civilian sector. This is, of course, a risky procedure. It could cause tension and rifts within a military between those who were career military professionals and those who came in mid-career. Steps would have to be taken to assure that those who joined the military mid-career reflected the ethos of honor, duty, and sacrifice that is essential to the functioning of a military. Some analysts are already voicing concern over the ethical repercussions of privatising many military functions. Even so, re-evaluating career paths in the military might be necessary.

The trend in the commercial world has been toward a blurring between management and staff. If this is extrapolated to the military, it might be necessary to consider whether the division of a service into enlisted personnel and commissioned officers makes sense in the 21st century. After all, this distinction arose to reflect the schism between commoners and aristocrats during the birth of modern militaries. Since societies are no longer organized that way, perhaps militaries should abandon the split between aristocrats and commoners. In addition, the organization of militaries into land, sea, and air services needs assessed.

Perhaps it would make more sense to organize them into components focused on a specific type of armed conflict—one for formal war, one for informal, and one for grey area war. Alternatively, postmodern militaries must consider whether a new service is needed for new operating environments. Martin Libicki, for instance, supports the creation of an “information corps” within the U.S. military. There are reports that China is considering formation of a fourth military service to concentrate on information warfare. Other analysts go even further than calling for a new service. For Robert Bunker, who is one of the more creative writers on future warfare today, this implies a fundamental change in the nature of warfare—not simply the appliqué of micro-processor based technology as in the official vision of the future, but the addition of a fifth dimension of warfare to three-dimensional space and time.

In stark contrast to the official vision of the future, Bunker holds that the United States is unlikely to attain dominant battlespace knowledge in cyberspace, whether in what he calls the “upper tier” which is the Internet and the electromagnetic spectrum, or the “lower tier” which is the stealth masking of physical forces. But, he predicts, other state militaries will do no better, so the prime enemy will be non-state actors, often criminals, with the flexibility and creativity to make use of cyberspace’s potential. For the U.S. military to be truly successful, Bunker argues, it must master new concepts like cyber-shielding, cyber-maneuver, and what he calls “bond-relationship” targeting that creates “tailored disruption within a thing, between it and other things, or between it and its environment by degrading, severing, or altering the bonds and relationships which define its existence.” Whether Libicki’s more modest proposal or Bunker’s radical one proves accurate for postmodern militaries, it is clear that those which are able to let go of old organizational patterns and embrace, even master new ones will be the most likely to succeed in future armed conflict.

ADJUSTING CIVIL-MILITARY RELATIONS.

The ability of a state military to succeed at armed conflict is determined, in part, by its relationship to the society it defends. Stable, healthy civil-military relations make it easier to sustain support for a military and for the military to recruit talented members. At the beginning of the 21st century, the changing nature of armed conflict will force every state military to evaluate and adjust its relationship with society. For instance, the ability of postmodern militaries to strike targets around the world very quickly and with apparent impunity will aggravate the tension between military commanders and civilian leaders.

Military commanders will recognize that speed and pre-emption increase the chances of operational success and decrease risk, while civilian leaders—at least those in democracies—will continue to see armed force as a last resort, only to be used when other methods have failed (and the risks to the military have thus escalated). Eventually the emergence of strategic information warfare and the increased significance of grey area war and infrastructure attacks will blur the line between military and non-military functions. Since so many factors shape civil-military relations—historical, economic, political, cultural, demographic, and so forth—every military will face a slightly different set of problems as it adjusts.

Despite some recent worries about a “crisis” in American civil-military relations, the U.S. military continues to be held in high esteem by the public. 152 This is due, in part, to the great efforts by the leaders of all the services to inculcate the highest ethical standards possible, and to stress sacrifice, honour, and duty. It is also due to the afterglow arising from the collapse of the Soviet Union and the American-engineered victory in the Gulf War. Eventually this will fade. If the future U.S. military is involved in murky and morally confusing conflicts against non-state actors and criminal cartels rather than aggressive dictators, public support might be shakier.

In 1992 Charles J. Dunlap, Jr. held that the use of the military in non-traditional roles, especially law enforcement functions, could shake the foundation of civil-military relations. While Dunlap’s literary device—a failed future military coup d’état in the United States—was deliberately far-fetched, his point merits serious consideration. The current health of American civil-military relations is based on the perception that: (1) the military has a vital job to do in defending the nation against external enemies, it does so very competently, and should receive adequate resources to do so; (2) the effectiveness of the U.S. military does not threaten domestic civil rights or political institutions; and, (3) the U.S. military represents the best of traditional American values. Changes in any of these three components could degrade civil-military relations.

This is not to suggest that American policymakers should eschew the use of the military for anything other than traditional warfighting. If informal or grey area war poses serious threats to American national security, the American people and their elected leaders are likely to demand the involvement of the U.S. military. But policymakers must be aware of the potential danger to civil-military relations. Among other things, any decline in the prestige of the military could complicate recruitment. The integration of more and more technology into increasingly rapid and complex operations makes it vital for the military to be able to attract the highest quality recruits. The prestige of service is a vital component of this. If the prestige erodes, it will be very difficult to attract talent, particularly in those realms like information technology and strategic leadership where the military competes directly with the commercial world for talent. Along these same lines, the U.S. military must continue its efforts to assure that its ethnic and gender composition reflects American society (even while insisting that its values reflect the best of American society rather than the norm).

The U.S. military must do its part to help forestall problems with civil-military relations. Foremost, it must assure that any capabilities or methods it develops reflect national values and strategic culture. For instance, it should eschew operational concepts that call for the pre-emptive use of force on the part of the United States or for actions that would indiscriminately harm non-combatants like attacks against satellites or information systems that are linked to global networks. It might be tempting to use hacker attacks to seize the economic or informational resources of, say, a grey area enemy, but if this entails intrusion into the information infrastructure of other states, its adverse political results could outweigh its military utility. Given this, the U.S. military should not even suggest such actions to political leaders. And, unless circumstances change in some fundamental way, the military should eschew development of dangerous new technologies like psychotechnology that run counter to American values like personal privacy and civil rights.

After Vietnam, the U.S. military stopped taking civil-military relations for granted and recognized that it was like a marriage or any other relationship: maintenance required hard work. As a result, the American military established a number of outreach and communications programs to solidify its links with the public and with elected leaders. In the 21st century security environment, successful militaries will emulate this. Those who leave civil-military relations to chance will suffer; those who nurture the relationship through the transition in the nature of armed conflict will have an easier time.

CONTROLLING FOR ASYMMETRY.

Since asymmetric conflict will be common in the opening decades of the 21st century, finding ways to resist or transcend it will be one of the determinants of success for militaries and other organizations that participate in armed conflict. When a postmodern state military is pitted against a modern state military or a modern non-state actor, time will be the key element. Postmodern militaries will attempt to use speed and knowledge to bring the conflict to quick resolution. Their enemies will seek protracted wars, whether through dispersion, deception, terrorism, counter-deployment operations, or persistence. This means that postmodern militaries must seek speedy resolution of conflicts. But what will happen if they fail?

Current American thinking about future war is based on the idea that if war becomes necessary, the preferred method is a quick resolution using cutting-edge, rapidly deployable forces and precision strikes against key targets. If sustained combat becomes necessary, then reserve component units (and, hopefully, allied forces) will be mobilized and deployed. Beyond existing reserve component units, plans for the creation, training, and equipping of new units are underdeveloped. Similarly, there are no plans for reconstituting the defence industrial base. Long wars are simply considered inconceivable. This is a potential problem. While everything suggests that the future United States (just like the current one) would prefer short wars, failing to plan for protracted conflict increases the chances it will occur. Given this, greater attention should be given to protracted war in the various wargames, seminars, and simulations that the U.S. military uses to think about future armed conflict.

Armed conflict involving a postmodern non-state actor is more difficult to assess, in large part because there are no full-blown examples to consider. It is not clear, for instance, whether a postmodern non-state actor could undertake a protracted conflict or not. In all likelihood, it could since it would not be constrained by the interconnectedness and legal/ethical frameworks that make protracted war difficult for nations. Asymmetric conflict with a postmodern non-state actor is thus likely to devolve into a contest of wills, with the side willing to pay the greatest price in blood and treasure coming out ahead. Successful 21st century militaries will be those who understand asymmetry, transcend it when possible, and moderate its effects when they cannot transcend it.

ADAPTING TO TECHNOLOGICAL SHIFTS.

The ability to accept and capitalize on emerging technology will be a determinant of success in future armed conflict. This is good news for the United States. No military is better at this than the American, in large part because no culture is better at it than the American. Americans are infatuated with technology. This has deep roots in history. As the United States grew and matured throughout the 19th century, the rapid expansion of the frontier led to persistent labor shortages. Technology, by substituting machinery for human muscle, offered a partial solution. What began, then, as a practical reaction to an economic problem eventually had a profound impact on national perceptions and attitudes, settling deep within the American collective self-consciousness. It is more than coincidence that much of modern, technology-intensive industry was born in the United States, or that wizards of technology from Eli Whitney through Thomas Edison to Bill Gates have become American cultural icons. Technology is part of how Americans see themselves, to reach for it is instinctive. This works to the advantage of the American military.

That said, there will be new, radical technologies with great promise which will challenge the ability of the military to master and integrate. In particular, robotics, miniaturization, and non-lethality are likely to provide the keys to future success. But resistance to automated systems will probably be intense. It was the manned combat aircraft, carrier battlegroup, armoured division, and Marine rifle

squad that made the U.S. military the dominant one on earth. The natural tendency will be to reject revolutionary technology in favour of appliqué technology that augments the capability of existing combat systems in some marginal way.

Eventually, the benefits of such an approach will peter out. The real issue will then be whether it is the U.S. military that first proves willing to jettison the old and adopt the new, or some other. History holds ominous warnings on this account. Seldom did the state that first began a revolution in military affairs end up mastering it. At one time, Britain and France were far ahead of Germany in aircraft and tank development. But Germany was more willing to innovate, in large part because of its military inferiority. The result was blitzkrieg. It is at least possible that the United States is blazing the way in the current revolution in military affairs, but will eventually be passed by another state or another non-state actor driven to innovation by desperation and perceived weakness. In any case, the future certainly belongs to those armed forces willing and able to integrate new technology and squeeze the maximum effectiveness from it.

ANTICIPATING SECOND AND THIRD ORDER EFFECTS.

Because strategy and armed conflict are so complex, any action has a multitude of second order effects (and third, fourth, and so on). Often, these become vital determinants of the future. When President Franklin Roosevelt authorized the Manhattan Project, for instance, who could have anticipated that this decision would eventually help to increase the strategic significance of rural guerrilla war (by raising the risks associated with traditional great power war), solidify the political and economic ties between the United States and its former enemies, Germany and Japan (by providing cheap security through extended deterrence), generate the “space race” as the United States and the Soviet Union competed for the strategic “high ground,” and inspire a global peace movement? In all likelihood, strategic decisions made today, particularly by the United States, will have equally profound second and third order effects on 21st century armed conflict.

Some of these second order effects will be strategic and political. To take one example, by vigorously pursuing a revolution in military affairs designed to augment power projection and, perhaps, to lessen the need for allies, the United States may very well encourage the strengthening of regional security structures designed to minimize the need for American involvement or intervention. In part, this is because Americans consistently fail to understand how intimidating the combination of U.S. military power, U.S. economic power, and American popular culture can be. To many people around the world, the fact that the United States currently faces no pressing threat to vital national interests yet is willing to spend billions, perhaps trillions of dollars to undertake a revolutionary improvement in its armed forces is frightening.

Washington, they conclude, must have plans to use the postmodern American military to impose its will on others. Even though U.S. policymakers are actually pursuing the revolution in military affairs as a way to retain the political utility of armed force and maintain the global political and economic gains made after the Cold War, the second order effects of this action are likely to prove adverse to American interests and objectives. Many future innovations will bring equally profound and equally unexpected second and third order effects. The development of military robotics, biotechnology, and psychotechnology, in particular, may unleash a hurricane of unpredictable political, legal, and ethical problems.

They may make armed force more precise and thus less horrific, or they may have the exact opposite effect and escalate the human costs to even higher levels. The growing interconnectedness among aggressor organizations may make the world a more dangerous place, or they may inspire greater interconnectedness among organizations dedicated to peace and security, thus making the world

safer. The benevolence or malevolence of change is not preordained. Ultimately, no one can fully predict the second order effects of innovations, much less third and fourth order effects. But this does not justify ignoring them. Any innovation, whether the development of new technology or the creation of new organizations and operational concepts, should be assessed for its broader political, social, cultural, ethical, and legal ramifications. It is probably unreasonable to expect militaries, even the most astute and farsighted ones like the U.S. military, to do this on its own.

As interconnectedness links diverse things, shaping the future of armed conflict increasingly will become a shared task among militaries and other agencies and organizations. As the creator of first postmodern military, the United States must pave the way in this. Even this will not allow all second and third order effects to be controlled, but the more they can be anticipated, the better the decisions will be on questions of accepting or rejecting change and innovation. Successful militaries in the 21st century will thus be those which create a seamless web with non-military organizations and agencies designed, in part, to anticipate second and third order effects.

PART IV: CONCLUSION AND RECOMMENDATIONS

CONCLUSION.

Historians will see the last decade of the 20th century and the first decade or two of the 21st century as a turning point in the evolution of armed conflict. At this point we know fundamental change is underway but can only guess its ultimate outcome. Having assumed responsibility for encouraging and sustaining security around the world, the United States has a huge stake in this shift. To a large extent, the ability of the U.S. military to adapt to changes in the nature of armed conflict will determine whether the result is a more stable world or a more dangerous one. So far, the U.S. military has undertaken substantial efforts to understand and master the changes underway in the nature of armed conflict. But all these remain encumbered by the historic successes of the 1980s and 1990s.

If the future wars which the U.S. military thinks about and plans for continue to look like reprises of the Gulf War or an updated version of a Warsaw Pact strike to the west, the American military may face 21st century war unprepared. No nation has ever undertaken a full revolution in military affairs unless it is responding to perceived risk or recent disaster. The paralysis of victory is great and vested interests always powerful. If historical patterns hold, the U.S. military may not be able to make the leap into the future on its own. It often seems that the Pentagon's plans for the future, including systems acquisitions, are based on "bygone battles." Even the prestigious Defence Science Board has questioned whether Pentagon leaders are willing take the risks necessary to transform the military.

Ultimately, firm prodding may be necessary. This could come from one of two directions. One is direct and persistent intervention by its political masters. This might come from Congress. The Goldwater-Nichols Department of Defence Reorganization Act established a precedent for congressional intervention in the armed forces. Congress felt that after years of cajoling, the U.S. military was not taking jointness as seriously as it should. Legislation was used to change this.

Outside intervention could also come from the President and Secretary of Defence if they were reform minded and willing to fight the inertia in the military and in the wider defence community. The second possible motive for revolutionary transformation, though, might be battlefield defeat. Just as the Battle of Jena led Prussia to serious military reform and defeat in World War I led Germany toward blitzkrieg, a bloody fiasco—if it did not cause an American withdrawal from global

engagement—might fuel a revolutionary transformation within the military. If the nation is lucky, visionary leadership rather than American blood will inspire the necessary changes.

RECOMMENDATIONS.

The key strategic challenges for the Army in the short- to mid-term (5 to 20 years) will be attaining greater strategic mobility, completing digitisation, and becoming as effective at shaping the strategic environment as it is at responding to threats. The key strategic challenges for the mid- to long-term (15-30 years) will be:

- developing and integrating robotics and miniaturized systems;
- stressing the full modularity of equipment, systems and organization;
- developing methods for the rapid transformation of doctrine, concepts, and organizations; and,
- developing greater psychological precision, including the full integration of non-lethal capabilities.

To prepare for this second wave of transformation, the Army should use its futures-oriented programs and intellectual resources, particularly the Army After Next Project and the War College, to explore the strategic implications of these challenges.

ENDNOTES

This study grew from a series of talks on the revolution in military affairs and future war given at locations ranging from Ouagadougou, Burkina Faso to the White House Conference Centre. I owe a deep debt to those who invited me to speak and those who prodded me with questions or observations following the talks. I'd also like to thank Robert Bunker, James Wirtz, Edward Greisch, Douglas Johnson, Earl Tilford, Douglas Schnelle, and John Garofano for insightful comments on earlier drafts of this study. All flaws and shortcomings that remain are purely my own and do so despite the best efforts of this group of cutting-edge strategic thinkers.

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