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**Nonlethal Technology and
Fourth Epoch War:
A New Paradigm of
Politico-Military Force**

**Robert J. Bunker
and
T. Lindsay Moore**

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LAND WARFARE PAPER NO. 23, FEBRUARY 1996

Nonlethal Technology and Fourth Epoch War: A New Paradigm of Politico-Military Force

by Robert J. Bunker and T. Lindsay Moore

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FOREWORD

The authors of this work argue by means of Fourth Epoch War theory that the introduction of nonlethal technology on the battle field will be as significant as the introduction of gunpowder during the European Renaissance. If these authors are accurate in this projection, it will mean that the Army, within the context of Force XXI, will be required to cope with both an entirely new concept of politico-military force and the emerging ethical debate which will surround its development.

Recent events appear to support this contention. Disclosures concerning the Iraqi biological program confirm agents were being specifically developed to seriously incapacitate opposing troops, rather than kill them, in order to place a greater logistical strain on Western forces. Closer to home, Secretary of Defense William J. Perry has announced that the Department of Defense prohibits the use of lasers specifically designed to cause permanent blindness of unenhanced vision. This has resulted in the Army's being ordered to discontinue its AN/PLQ-5 Laser Countermeasures System program whose M-16 rifle-mounted laser weapon is designed to be used against the optical sights of enemy armored vehicles, which may incidentally have such blinding effects.

Because this Land Warfare Paper raises many important implications and fundamental questions concerning nonlethal technology and its relationship to Force XXI, we offer it as a vehicle toward new avenues of professional military debate.



JACK N. MERRITT
General, U.S. Army Retired
President

February 1996

Nonlethal Technology and Fourth Epoch War: A New Paradigm of Politico-Military Force

Introduction

How politico-military force will be employed in future war is of major concern to U.S. national security and, because of its operational leadership in this area, to the Army's Force XXI campaign plan. It is envisioned that such force will qualitatively change because of the introduction of advanced technology. This technology will extend the West's continuing mastery of the application of political violence. No longer in war will the West have the capability solely to kill; now, like a martial arts master, it will be able to rely upon nonlethal means to disarm an opponent.¹ As a result, an effective national policy to deal with the appropriate employment of technologically advanced politico-military force will become a challenge of the first magnitude. How our policy makes use of this new method of waging war has far-reaching and potentially dangerous national security implications.

Until recently, nonlethal technologies have existed in "black" (i.e., classified) programs with little information being made public.² With more information being released as funding for a number of these programs becomes imminent, their potential impact is becoming apparent.³ The vast potential that nonlethal technologies provide has already been recognized by visionary military scholars. Col. John A. Warden III, USAF, in a recent briefing concerning "Non Lethal Concepts of Operation," stated that:

Non lethal technologies do not appear to be merely tactical tools with limited utility; rather, they appear to be strategic and operational level technologies which give us powerful new concepts of operation which can allow us to achieve political and military objectives in ways not previously possible.⁴

Russian military experts, whose Soviet predecessors were the first to recognize the military technical revolution (MTR) or what in the West is called the revolution in military affairs (RMA), also "view nontraditional weapons as the next stage in the ongoing MTR. They continue to examine the roles of air-, sea-, and space-based directed-energy weapons, as well as the role of systems termed nonlethal in the West."⁵

It is this potential that nonlethal technologies offer, how they will influence the American use of politico-military force in the 21st century, the policy surrounding the use of this force, and the fundamental concerns that such a trend projection raises that will be discussed in this essay.

Trend Projection

The incorporation of nonlethal technologies by our armed services is envisioned to result in the development of dual-capability lethal- and nonlethal-based warfare during the transition period to Fourth Epoch War.⁶ The basic principle behind the epochs of war is the profound impact the energy foundations of Western civilization have exerted on its military and social organization. The First Epoch was based on human energy, the Second Epoch on animal energy and the Third Epoch on mechanical energy. The emerging Fourth Epoch will be based upon a postmechanical energy foundation.

While the three earlier epochs were based solely upon the use of lethal force, the emerging Fourth Epoch will see an expansion of the concept of coercive force. The nonlethal capability which is now developing will continue to grow in importance until it surpasses lethality-based warfare as the preferred means of conducting war in the West. This will take place because the politico-military value of this emerging nonlethal force capability will ultimately be viewed in the decades to come as superior to a lethal capability toward the furtherance of national security policy for three primary reasons:

- Fewer political objections result from the application of nonlethal force as opposed to the application of lethal force.⁷
- Disabling an opponent is more efficient than killing an opponent.
- Precision over politico-military force application allows an entire spectrum of responses which can be brought to bear in a conflict scenario.

The first point is a by-product of the global news media broadcast trend, the “CNN effect,” which has developed.⁸ It represents a major component in the shift in American society which has resulted in a public no longer willing to accept the loss of American lives, or for that matter the lives of indigenous peoples, in foreign military operations except in “just war” circumstances.⁹

Domestically, many of our American city cores are beginning to resemble Third World environments where the rule of law requires restoration at least periodically by force (e.g., the Los Angeles riots); nonlethal means will also become increasingly relied upon in these circumstances to help restore order. This is a trend which is intensified by the negative public opinion concerning the use of deadly force on American citizenry — even more so than on foreign populations.

It is envisioned that this operational constraint on the use of lethal force will dominate politico-military concerns over the next decade or two. Ultimately, the use of nonlethal force to achieve national security policy goals will be viewed as superior to lethal force in some situations because its use will be less apt to be challenged by public opinion. This potentiality is actively influencing the Department of Defense which, under the lead of Charles F. Swett, Assistant for Strategic Assessment, is currently in the process of for-

mulating “policies and procedures governing the role of nonlethal weapons in U.S. national security, their acquisition, and employment.”¹⁰ The working definition of these weapons is as follows:

Non-lethal weapons are discriminate weapons that are explicitly designed and employed so as to incapacitate personnel or material, while minimizing fatalities and undesired damage to property and the environment.

Unlike weapons that permanently destroy targets through blast, fragmentation or penetration, nonlethal weapons have relatively reversible effects on targets and/or are able to discriminate between targets and non-targets in the weapon’s area of impact.¹¹

This emerging policy will probably explicitly ban funding for nonlethal weapons which do not satisfy a number of criteria. The most relevant of these criteria, for our purposes, is the one requiring nonlethal weaponry to “have an acceptably low probability of being fatal or inflicting permanent disablement on personnel, and causing undesired damage to property and the environment.”¹²

The second of the three points may become even more important than the first within the very near future. It is based on the idea that the long-term disablement of an opponent is far more efficient than the killing of an opponent. Disablement creates a greater burden (economic, social, psychological, political, etc.) on the opposing political grouping (nation-state, subnational group, mob, etc.) than does the death of one of its members.

Such a perception is at odds with modern Western ideas governing the conduct of war (e.g., the Department of Defense policy draft on nonlethal weapons) and current arms control treaties. Soviet military experts who have analyzed the role of advanced technologies in the Gulf War as a prototype of future war, however, have already reached the conclusion that “the Gulf War demonstrated that a qualitative future has replaced the quantitative past of warfare. And the heart of current arms control treaties is said to belong to that past.”¹³ Because the potential that new technologies offer is not being constrained by old ideas governing their use in the Russian successor state, and undoubtedly in many non-Western states and subnational groups who do not share current Western moral inhibitions, we have decided to give serious consideration to this politico-military force path in our trend projection.

The third and final point is based on the great utility offered by the tailored application of political violence. Killing, as previously mentioned, is not always the most efficient application of coercive force. Based on the differing needs of military (foreign) and police (domestic) force requirements, it is thought that two divergent, yet integrated, threads of nonlethal weaponry will develop:

- short-term incapacitation (physical-mental/perceptual disruption);
- long-term incapacitation (physical-mental/perceptual disruption).

These threads will be combined with current lethal technology, and future advances in that area, to provide three levels of politico-military force options available to American decision-makers in the 21st century where only a lethal option existed before. Further, these politico-military force options will be applied against both the physical and mental/perceptual attributes of human and machine targets. (See matrix 1.)¹⁴

These future force options will significantly influence the development of Force XXI operational concepts. As a result, radically new post-Clausewitzian concepts of politico-military force application will begin to develop because, when what before appeared as discrete and unrelated forms of warfare (e.g., information/electronic warfare, chemical warfare, biological warfare, propaganda warfare) and advanced technologies (e.g., directed energy, acoustic projection, computer viruses, genetic engineering) are taken together, they yield a coherent vision of future warfare which has no parallel in the past.

Matrix 1				
21st Century Politico-Military Force Spectrum				
FORCE	HUMAN (Physical)	HUMAN (Mental/ Perceptual)	MACHINE (Hardware)	MACHINE (Software)
Short-term Incapacitation	<ul style="list-style-type: none"> • Bean Bag • Infrasonic • Rubber Bullet • Sponge Grenade • Taser • Tear Gas 	<ul style="list-style-type: none"> • Directed Light • Hydrogen Sulphide Gas • Pheromonal • Strobe Light 	<ul style="list-style-type: none"> • Antitraction • Carbon Fibers • Sticky Net • Super-adhesive 	<ul style="list-style-type: none"> • Frequency Jammer • Low Voltage • Multitasking Virus
Long-term Incapacitation	<ul style="list-style-type: none"> • Acoustic • Laser • Microwave • Mustard Gas • Radiological 	<ul style="list-style-type: none"> • Behavior-Altering Drugs • Genetic Alteration • Neuro-Implant • Propaganda 	<ul style="list-style-type: none"> • Acetylene Bubbles • Anti-Material Corrosive • Anti-Plastic Microbes • Polystyrene Pellets 	<ul style="list-style-type: none"> • Computer Virus Weapon • High Voltage Pulse • Sleeper Virus
Deadly	<ul style="list-style-type: none"> • Artillery Barrage • Rifle Round 	<ul style="list-style-type: none"> • Death Hologram • Hyper Sleep Deprivation 	<ul style="list-style-type: none"> • Armor Piercing • High Explosive Antitank 	<ul style="list-style-type: none"> • Nonnuclear Electro-magnetic Pulse

Two general observations can be made concerning these politico-military force options. Against an advanced technology opponent, nonlethal technology applied against machines (specifically information machines) will probably dominate.¹⁵ This fact already appears well known to subnationals hostile to the West given the high numbers of computer viruses which originate in the Middle East and on the Indian subcontinent. For this reason, the Pearl Harbors of the 21st century will probably occur in cyberspace (e.g., on the Internet or in the financial records of a major bank) and can as easily be initiated by a drug cartel against a nation-state as by one nation-state against another.

Against a non-Western opponent lacking advanced technology, such as a local warlord, nonlethal technology applied against humans will presumably dominate. In the evacuation of United Nations forces in Somalia in late February 1995, U.S. Marines brought with them rubber bullets, bean-bag shotguns and two kinds of sticky foam. While only sticky foam was used to cover the final withdrawal, its deployment was a watershed event, one which signifies a future dominant component in U.S. politico-military force application in less developed countries. Further, many of these countries are becoming increasingly urbanized and therefore pose extremely restrictive future battlefield environments for Army soldiers. Not surprisingly, given the striking combat environment parallels, the origins of much of this technology can be directly linked to the Vietnam era when it was developed for antipersonnel weapons.¹⁶

Having made these general observations, the three types of force which will exist in the 21st century will be addressed. Their application against humans rather than against machines will be the focus, however, because of the greater ethical implications that will develop. Although short-term incapacitation has both domestic and foreign application, it is its domestic application by police forces that will conceivably dominate for quite some time. In use on American citizens, the short-term incapacitation this form of nonlethal technology allows is exactly what is required in riot and crowd control scenarios.¹⁷

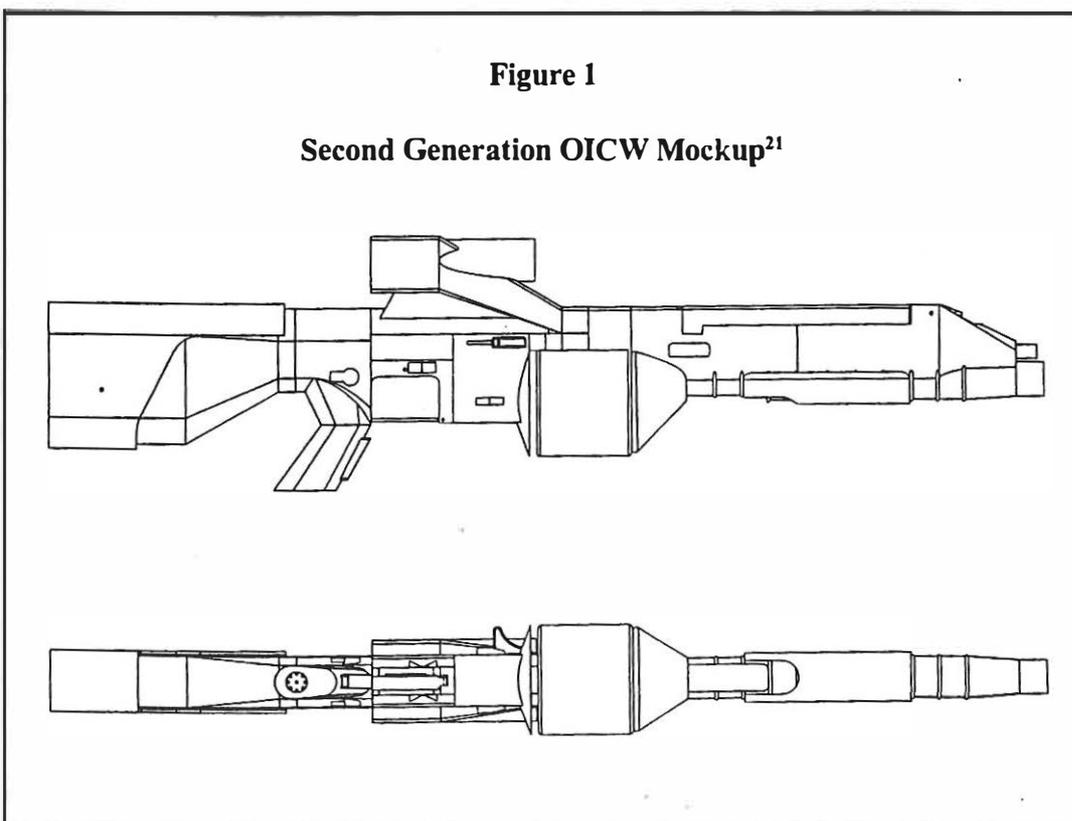
Long-term incapacitation would result in citizens who become an economic and political burden on our polity — an undesirable end — and the antithesis of what our nation stands for. This form of force also has immense utility in foreign engagements, perhaps predominantly so in the next couple of decades. Peacekeeping operations will continue to be required, as will warnings to hostile polities threatening greater use of force unless American policy dictates are complied with.¹⁸ An example of the application of this last form of force might be delivering of acetylene bubbles or solvent pellets via cruise missile or artillery delivery systems, thus rendering the internal combustion engines of a tank column of a hostile nation inert at the border of the country it is intent on seizing.¹⁹

Additionally, long-term incapacitation technology would be used against certain hostile forces abroad because it creates a burden for the opposing polity far out of proportion to that of the use of lethal force. It is commonly accepted on the battlefield that nonlethal casualties remove multiple soldiers from combat and place greater strain on the sustainability of an armed force than do fatalities. The potential of this form of force is

apparent, however, when taken to a macro-level of abstraction, resulting from a conscious policy on the part of United States' or other countries' armed forces to inflict long-term incapacitating, instead of lethal, wounds on opposing combatants.

Deadly force, the third component of the envisioned 21st century politico-military force spectrum, is the traditional form of force used in the Western conduct of war and in domestic law enforcement since no precision has existed over the control of political violence. In the future, when the application of nonlethal force is available but not sufficient to induce compliance, lethal force will still be an option of last resort. In other instances, however, lethal weaponry will continue to be the initial form of force application. A danger exists in creating the expectation of "thresholds of force" which must be followed because it would limit U.S. flexibility in its response to future international crises.

As a result of these politico-military developments, during the transition to Fourth Epoch War, dual-capability weapons (i.e., lethal and nonlethal) will begin to be fielded as the West (and the United States in particular) begins to "work out" the application of nonlethal technology. One such prototype weapon is the Objective Individual Combat Weapon (OICW), the likely successor to the M16A2/M203 rifle/grenade launcher, which merges a standard 5.56mm lethal kinetic-energy round capability with a 20mm drum which can be filled with either high explosive- (HE) or soft-drag grenades laden with tear gas (CS) or marking dye for crowd control purposes. (See figure 1.)²⁰



Even more advanced prototypes of these weapons are beginning to exploit nonengine-based forms of energy. Some explanation, at this point, is required. A modern assault rifle is essentially an engine-based system. It mimics an engine in that each bullet represents a one-way piston which is ejected after each internal combustion takes place. For low-energy lasers, holographic projectors, high-power acoustics and other advanced devices to be fielded, more powerful energy sources beyond engine-based forms are ultimately required.²²

The movement toward nonengine-based forms is a critical development because it represents an integral aspect of Fourth Epoch War theory which forecasts the future fielding of qualitatively advanced military weaponry as one attribute of the energy paradigm shift between the Modern and the Post-Modern worlds. As a result of this energy shift, weapons such as “brilliant laser rifles” will ultimately be fielded in the decades to come with variable intensity settings to allow them the capacity of being used across the politico-military force spectrum.

Fundamental Concerns

The projected trends regarding the massive impact of nonlethal technology on the use of American politico-military force in the 21st century raises three fundamental concerns.

The first concern, which deals with methodology, is that the importance of nonlethal technology may just be a mythical “silver bullet.” Such a concern results from the revolution in military affairs (RMA) having heretofore been defined solely as a “technical legacy” to the exclusion of other critical issues such as “purpose, strategy, doctrine, operational innovation and organizational adaptation.”²³ This projection, however, not only acknowledges the existence of such idea-based concerns, but is founded on the premise that ideas form half of the synthesis, along with technology, required for qualitative military change.²⁴

The three energy epochs of Western civilization and a fourth emerging one isolated in earlier work support such a premise. The First Epoch represents the Classical age when human energy dominated military organization, as witnessed by the development of the phalanx and the legion, and the economy which was based on slave-holding. The Second Epoch represents the Medieval world when animal energy dominated military and economic organization. Cavalry dominated the feudal array and oxen and horses represented the chief motive source of an economy based on fief-holding. The Third Epoch represents the Modern world when mechanical energy based on machine, later engine forms, dominated military and economic organization. Varying forms of artillery (broadly defined) dominated the conduct of war while mercantilism, and later capitalism, became the basis of economic production. The emerging Fourth Epoch represents a Post-Modern world based on postmechanical forms of energy, resulting in the development of qualitatively new forms of military, economic and social organization.

Each of the three earlier epochs witnessed one or more energy sequences developing. An energy sequence is based first on the experimental exploitation, and later institutionalization, of a specific form of energy. The emergence of the Fourth Epoch means that an experimental era is now being entered. This era has great similarities to the European Renaissance, which is generally accepted as a period of historical transition, because it witnessed the emergence of the arquebus, a form of technology which also represented an experimental era of energy source exploitation.

This projection recognizes that the body of competing technologies that nonlethal weaponry represents greatly parallels the fielding of the arquebus. Because the technology embodied in the arquebus was so qualitatively advanced and misunderstood by the dominant knightly culture of the era, attempts were made to ban its introduction on the battlefield. Ultimately, however, the technology the arquebus introduced on the battlefield vis-à-vis preexisting weapons

was shown to have far wider application: that is, it displayed more promise. The concept of promise can be understood if we consider the decision to abandon the longbow and crossbow in favor of the arquebus. A comparison between the three would show that the longbow was a relatively easy weapon to manufacture but required extensive training in its use. The crossbow, on the other hand, was difficult to manufacture but easier to train a soldier to use. The arquebus combined the worst of both systems. It was difficult and costly to manufacture, and required a lengthy period of training in the complexities of its use. Yet the two forms of the bow had exhausted their potential; the energy they employed had reached the limit of its efficient use in that form. The arquebus, primitive though it was, could be seen to have great developmental potential; no such potential could be envisioned for either longbow or crossbow.²⁵

The multitude of competing nonlethal technologies which now exist are based on a wide range of kinetic, electric and chemical forms, according to Dr. Edward P. Scannell, a leading expert in this field of study.²⁶ We, however, expand this concept and take the position that far more nonlethal technology forms, not traditionally defined as such by the military services, exist. These include, but are not limited to, propaganda/psychological, informational and biotechnological forms usually considered to provide the basis for other separate and distinct types of warfare. (Refer back to matrix 1.)

This proliferation of nonlethal weaponry, also qualitatively advanced and misunderstood by the dominant military culture of our era, has parallels in the earlier epochal shift (between energy paradigms) which took place between the Second and Third epochs. The European conduct of war during the centuries prior to 1500 was fragmented in nature because it reflected the regional forms of warfare that had developed. These local forms of warfare exploited competing forms of mechanical-based weaponry and competing ideas concerning how they should be fielded. It was not until the stunning French invasion of Italy in 1494 under Charles VIII's army which "mixed these weapon systems

and tactical perspectives” that a Europe-wide form of warfare began to develop.²⁷ Because of the significant historical precedents, we are confident that the projection concerning the profound importance of nonlethal technology is reasonably accurate. In fact, it can be said that the introduction of nonlethal technology on the battlefield will be as significant as the introduction of gunpowder during the European Renaissance.

The second fundamental concern focuses on the synergistic effect resulting from the interaction of nonlethal technology, recognized as only one developmental thread of advanced technology warfare, with other emerging future trends. The parable of the blind men and the elephant is a useful conceptual tool to introduce at this point. Many military and academic scholars are now engaged in defining what the RMA “elephant” will look like when it matures. Like the blind men of the parable, each scholar seems, in general, able to focus on only one major aspect of this as yet unrecognizable creature. Arquilla and Ronfeldt (Cyber War), the Tofflers (Third Wave War), de Caro (Soft War) and others focus on the information/electronic aspect of the RMA.²⁸ Metz and Kievit argue that the biotechnological aspects of this creature “including genetic engineering and advanced behavior-altering drugs” may potentially be more profound.²⁹ De Landa (Robots) and Anderberg and Wolbarsht (Lasers) focus on still other aspects of the RMA.³⁰ To add to this confusion, Lind et al. (Fourth Generation Warfare), van Creveld (Non-Trinitarian War) and Huntington (Cultural War) focus on the rise of very credible non-Western threats which can be likened to an anti-RMA “mouse.”³¹

Information/electronic, biotechnology and robotic developments will have profound nonlethal politico-military force applications.³² Less exotic applications such as computer viruses, electronic jamming operations, media broadcasts and carbon fiber-filled Tomahawk missiles (launched against Iraqi power plants during the Gulf War) have already been recognized.³³ More esoteric applications could include the deployment of static and mobile machine soldiers which dispense sleeping gasses for crowd control purposes, nonnuclear electromagnetic pulse (NNEMP) generators or Col. Warden’s envisioned “holographic prophet” projected over a hostile capital whose radio and television broadcasts have been seized and are being used against it.³⁴

The value of recognizing the contribution each group of scholars provides concerning this “elephant” and its “mouse” sidekick is apparent. The advanced technology thread spotlighted in this essay will impact these other trends while at the same time being influenced by them. The approach we have taken is to focus on a broader and more inclusive framework that accounts for both of these creatures within our energy based paradigm.

We argue further that the foci of the various scholars can be seen as reflecting the simultaneous nonlinear generation of attributes of epochal change between the Modern and Post-Modern worlds in the same manner as that which took place during the Western Renaissance five centuries ago. This is a perception currently held by relatively few American strategic thinkers because most primarily focus only on narrow military and geopolitical concerns.

The final fundamental concern raised by our projection entails the impact the incorporation of nonlethal technology will ultimately have on American political and military institutions — though this concern should be broadened to include the incorporation of all forms of advanced technology embodied in the RMA.

It is generally recognized that between approximately 1815 and 1830, Western historical patterns became compressed with the advent of industrialization. This has resulted in subepochal change (or change which takes place in an energy paradigm), which once took centuries to occur, now taking a little more than a century to be completed.³⁵ This increasing rate of change and the fact that an epochal, rather than subepochal, shift is taking place, increases the probability of a new national security dilemma emerging from our nation's relationship with advanced technology. This relationship is similar to that of humanity toward Pandora's box—a box full of unwanted evils and hope. This is not a Luddite perception but one gained from an intimate appreciation of Western historical and political development.³⁶

Additionally, the future incorporation by our nation of the politico-military force spectrum envisioned in this essay will have important and unexpected consequences. Recent events provide early warnings for this concern. In military operations in Somalia and Haiti where CS and pepper spray, representing short-term incapacitants, were carried by individual soldiers, the authorization for the use of this nonlethal force had to be obtained at the level of the Joint Chiefs of Staff. Hence, the use of nonlethal force and what it represents, both socially and politically, is already clashing with traditional ideas on how to conduct modern military operations. Our military rules of engagement (ROE) are becoming increasingly irrelevant to the new capabilities even these primitive forms of nonlethal technology are posing.

Concerns over the influence the introduction of nonlethal technology will have on lowering the threshold for the use of military power, on redefining an act of war and on eroding soldier combat skills have also been expressed by some scholars. War may no longer seem so repulsive as it once was and therefore we may rely upon it more often in the pursuit of national objectives — much as we did initially in the Civil War and Vietnam because we thought each conflict would be short and neat. Furthermore, defining an act of war now becomes problematic.³⁷ Would a highly effective propaganda attack against an opposing polity now be grounds for launching an overt military strike?

It is also envisioned that extensive reliance on nonlethal weaponry to incapacitate enemies will have an unfortunate side effect of making it extremely difficult for our troops to kill, even when their lives depend on it. It has been estimated that about six months of training may be required to properly resocialize many troops into the act of killing after relying on nonlethal weapons for prolonged periods of time.³⁸

The implications of a conscious decision, which could come about unilaterally or far more likely as a reaction to the policy of a hostile power, to inflict long-term incapacita-

tion by U.S. forces on opposing combatants can thus be imagined. The problem concerning the ethics of employment will again arise. This time, however, nonlethal technology may well be considered inhumane.³⁹ Many, in fact, may argue that it is more humane to kill opposing soldiers than to purposefully implement a defense policy which seeks to permanently blind them, disrupt their nervous systems or severely degrade their lung capacity, while others will argue that it is better to have lost sight or lung capacity than to be dead.⁴⁰ References to the horrors of the gassings of the First World War will undoubtedly be made. Furthermore, the potential for a new form of martyrdom based on those living, not dead, will arise.

This and other dilemmas will undoubtedly be compounded as the capacity to employ such nonlethal force on the battlefield becomes increasingly more precise over the decades to come with the deepening mastery of America's armed forces over the conduct of war. The capacity to precisely inflict long-term incapacitating disabilities will likely create an intense debate within our armed forces, and the nation that it mirrors, regarding the accepted norms of conducting modern warfare.⁴¹ Such a debate will center on the question of whether a democratic society should be allowed to wage war in this fashion.

The effects of this one moral dilemma will be magnified if just a few other advanced technology developments take place. Such developments under consideration include the fielding of early robotic systems which are unable to take prisoners, the wearing of battle suits which automatically inject severely wounded soldiers with adrenal hormones and pain-suppressers to keep them in combat, and the battlefield harvesting of the organs of fallen soldiers to save the lives of their comrades. Clearly, if enough events following this pattern take place too rapidly, our political and military institutions have the potential to become overwhelmed by the ethical dilemmas that will ensue.⁴²

Conclusion

From this nonlethal technology trend projection, including the development of the 21st century politico-military force spectrum capability it provides, the policy questions surrounding its use and the fundamental concerns this has spawned, it is argued that at least two things need to occur. The first is that the revolution in military affairs (RMA) debate within the Army needs to be broadened to incorporate a political dimension. Periods of massive military change, such as we are now entering, do not take place in a political vacuum and for that reason the concept of a "revolution in political and military affairs" (RPMA) needs to be developed.⁴³ To continue this debate only within military parameters will result in both a myopic and inaccurate vision of the future, one which ignores the true magnitude of the changes now occurring in our economic and societal structures, and may lead to alienation from the broader political process and the American people.

The second is that the Army is going to have to rise above the intense rivalries that are a function of defense reductions and the current roles and missions debate. As the recog-

nized leader of future warfighting doctrinal innovation and institutional adaptation, it must take the lead with government, industry and the other armed services in a new and critical venture. This undertaking must ensure that the cutting-edge technology that is currently being developed for military purposes, much of which is now in fact derived from commercial industry, does not unintentionally compromise national security by being too advanced for our society in general, and political and military institutions in particular, to accommodate.

Our nation is built upon an interwoven matrix of technology and ideas. The potential exists for this synthesis to be irrevocably shattered by the introduction of qualitatively advanced military technology. Historical precedents exist as a basis for such concerns.⁴⁴ Our government, therefore, must proceed with absolute caution when negotiating the uncertain path we have begun. To do this, a nonpartisan governmental body must be assembled whose function is to develop a coherent and comprehensive policy concerning the introduction of advanced technology into our armed forces so that our national institutions do not become destabilized, while allowing our military forces to retain their technical warfighting edge.

ENDNOTES

The individual contributions of Dr. Edward P. Scannell; Col. John A. Warden III, USAF; Mr. Charles F. Swett; Maj. Robert W. Gee, USA; Dr. Mark T. Clark; Dr. Steven Metz; Dr. Howard Jackson; Lt.Col. Matthew Begert, USMC; Mr. Chris Nowak and Mr. Lucian Sadowski, and the organizational contributions of the Office of the Assistant Secretary of Defense (Special Operations/Low Intensity Conflict), U.S. Army Armament Research Development & Evaluation Center; U.S. Army Military Police Battle Lab Support Division and Marine Corps Association toward this essay are acknowledged. This essay was written during the early months of 1995. All errors are the sole responsibility of the authors.

1. See Alan W. Debban, "Disabling Systems: War-Fighting Option for the Future," *Air Power Journal*, Spring 1993, pp. 44-50; Thomas E. Neven, "Nonlethal Weapons: Expanding Our Options," *Marine Corps Gazette*, December 1993, pp. 61-62; Barbara Starr and Arthur Knoth, "Less Than Lethal" articles, *International Defense Review*, July 1994, pp. 29-39.
2. Knoth, "Less Than Lethal," p. 33.
3. Chris and Janet Morris have written extensively on nonlethality and were among the first to recognize the significance of this new technology because of their nontraditional backgrounds. They do not currently possess the proper politico-military expertise, however, to incorporate their visionary insights into a broader theory of warfare. For their current thoughts on this subject matter see Chris Morris, Janet Morris and Thomas Baines, "Weapons of Mass Protection: Nonlethality, Information Warfare, and Airpower in the Age of Chaos," *Air Power Journal*, Spring 1995, pp. 15-29. For funding information and the Army's planned fielding of an M-16 mounted laser weapon see Glenn W. Goodman, Jr., "Upping The Nonlethal Ante: Pentagon Funds A New Weapons Initiative," *Armed Forces Journal*, July 1994, p. 13.
4. Col. John A. Warden III, USAF, "Non Lethal Concepts of Operations," unpublished draft paper, p. 4; presented during the "Non-Lethal Technologies" Seminar at the Sixth Annual Special Operations/Low Intensity Conflict-Counter Drug (SO/LIC-CD) Symposium and Exhibition entitled "Operations Other Than War: Challenges and Requirements," held by the American Defense Preparedness Association in Washington, D.C., December 14-16, 1994. Col. Warden is the Commandant of the Air Command and Staff College and one of the chief architects of the air campaign in the Gulf War.
5. Mary C. Fitzgerald, "The Russian Image of Future War," *Comparative Strategy*, April/June 1994, p. 171.

6. This theory was first developed by the authors in 1987 in a graduate research seminar on Classical warfare at the Claremont Graduate School. For an overview see Robert J. Bunker, "The Transition to Fourth Epoch War," *Marine Corps Gazette*, September 1994, pp. 20-32.
7. Also recognized by Col. Warden: "[L]ethality is increasingly dysfunctional from a political standpoint," p. 4. His paper represents a significant contribution concerning the beneficial humanitarian aspects nonlethal technology provides. This offers a fourth reason not developed in this essay because it does not represent a form of coercive force. The antilethal potential mentioned by Chris and Janet Morris would represent a fifth argument for the utility of these new technologies.
8. Concerning the "CNN effect" see Chuck de Caro, "Sats, Lies and Video-Rape: The Soft War Handbook," unpublished paper, Aerobureau Corporation, 1994, pp. 1-40; Frank J. Stech, "Winning CNN Wars," *Parameters*, Autumn 1994, pp. 37-56; Richard H. Sinnreich, "The Changing Face of Battlefield Reporting," *Army*, November 1994, pp. 30-34.
9. Other factors are also involved such as new family demographics; see Edward N. Luttwak, "Where are the Great Powers? At Home with the Kids," *Foreign Affairs*, July/August 1994, pp. 23-28.
10. Department of Defense Directive. Policy for Non-Lethal Weapons. Draft: 21 July 1994, p. 1. Mr. Swett, Assistant for Strategic Assessment, Office of the Assistant Secretary of Defense for SO/LIC, was moderator of the "Non-Lethal Technologies" Seminar at the Sixth Annual SO/LIC-CD Symposium and Exhibition.
11. *Ibid.*, p. 1.
12. *Ibid.*, p. 3.
13. M.C. Fitzgerald, "The Soviet Image of Future War: 'Through the Prism of the Persian Gulf,'" *Comparative Strategy*, October-December 1991, p. 427.
14. This matrix represents only an elementary listing of nonlethal weaponry gathered from about a half-dozen open source articles on this subject.
15. Proposed by Dr. Steven Metz, Strategic Studies Institute, U.S. Army War College.
16. Stockholm International Peace Research Institute (SIPRI), *Anti-personal Weapons*, Ch 8, "Electric, Acoustic and Electromagnetic-Wave Weapons" (London: Taylor & Francis Ltd., 1978), pp. 202-210.
17. Tear gas and pepper spray are already commonly used by police forces to quell small local disturbances; however, the application of this technology on a large scale

has not yet taken place. Regardless, police policy is primarily based upon the use of deadly force. Discussion with Jaime Cuadros, president, Arts and Engineering, at Sixth Annual SO/LIC-CD Symposium and Exhibition.

18. Guantanamo Bay, Haiti and Somalia all provide recent examples of the need for nonlethal force. Current platforms are inadequate for this task. Potential technology programs which have been highlighted for the near term are optical/flash, kinetics, acoustic/bang, calmatives, pyro/electric stun; far-term programs which have been highlighted are entanglements/air bags, sticky/slippery, engine kill/EMP/super reagents, high intensity pulsed light/psychotechnology, radio frequency. "Military Police NonLethal Technology Program" presentation delivered by Maj. Robert W. Gee, USA, Chief, Military Police Battle Lab Support Division, U.S. Army Military Police School, at the "Non-Lethal Technologies" Seminar at the Sixth Annual SO/LIC-CD Symposium and Exhibition.
19. Stephen Budiansky, "All stuck up, no way to go," *U.S. News and World Report*, July 20, 1987, p. 62.
20. The term "less-than-lethal" is at times used since in this instance, as in most cases, lethality is a potential result; a 20mm sponge-grenade is deadly within 25 meters of firing and an eye-shot outside of this range can either be fatal or cause the permanent loss of vision. Conversation with Lucian Sadowski at Sixth Annual SO/LIC-CD Symposium and Exhibition: A non-lethal 40mm cartridge for the M203 grenade launcher had earlier been developed by U.S. Army Armament Research Development & Evaluation Center (ARDEC); Barbara Starr, "Pentagon Maps Non-Lethal Options," *International Defense Review*, July 1994, p. 32.
21. Figure 1 printed by permission of ARDEC. Drawn by P.W. Sherwood, 10 March 1994, full scale.
22. "Many NLWs require a source of high energy, so that their battlefield use is inherently restricted." (Arthur Knoth, "Disabling Technologies: A Critical Assessment," *International Defense Review* July 1994, p. 39.) The same energy problem exists for other advanced forms of military technology. See Dr. Robert J. Bunker, "The Future Soldier System: An Energy Perspective," *Army RD&A Bulletin*, September-October 1994, pp. 42-44.
23. Jeffrey R. Cooper, *Another View of the Revolution in Military Affairs*, U.S. Army War College Strategic Studies Institute, July 15, 1994 (Washington D.C.: U.S. Government Printing Office, 1994), p. iii.
24. T. Lindsay Moore, "The Structure of War." Unpublished paper, 1989, pp. 1-33; Robert J. Bunker. "The Transition to Fourth Epoch War," *Marine Corps Gazette*, September 1994, pp. 20-32.

25. Moore, "The Structure of War," pp. 15-16.
26. Dr. Edward P. Scannell was a panelist at the "Non-Lethal Technologies" Seminar at the Sixth Annual SO/LIC-CD Symposium and Exhibition. He is Supervisory Physicist, Radio Frequency (RF) Effects and Hardening Technology Branch, U.S. Army Research Laboratory.
27. Archer Jones, *The Art of War in the Western World*, 1987, (Urbana: University of Illinois Press), p. 182.
28. John Arquilla and David Ronfeldt, *Cyberwar is Coming!* (Santa Monica: RAND, 1992) P-7791; Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century* (Boston: Little, Brown and Company, 1993); Chuck de Caro, "Sats, Lies and Video-Rape: The Soft War Handbook," unpublished paper, Aerobureau Corporation, 1994.
29. Viewed as a second distinct RMA from the more mature electronic one. Steven Metz and James Kievit, *The Revolution in Military Affairs and Conflict Short of War*, U.S. Army War College Strategic Studies Institute, (Washington, D.C.: U.S. Government Printing Office, July 25, 1994), p. 32.
30. Manuel De Landa, *War in the Age of Intelligent Machines* (New York: Swerve Editions, 1991); Maj Gen. Bengt Anderberg and Dr. Myron L. Wolbarsht, *Laser Weapons: The Dawn of a New Military Age* (New York: Plenum Press, 1992).
31. William S. Lind et al., "The Changing Face of War: Into the Fourth Generation," *Marine Corps Gazette & Military Review*, October 1989; William S. Lind, "Defending Western Culture," *Foreign Policy*, Fall 1991, pp. 40-50; Martin van Creveld, *The Transformation of War* (New York: The Free Press, 1991); Samuel P. Huntington, "The Clash of Civilizations?" *Foreign Affairs*, Summer 1993, pp. 22-49, and "If Not Civilizations, What?" *Foreign Affairs*, November/December 1993, pp. 186-194.
32. This synergistic potential has also been inversely recognized from digitalization to nonlethal technology by Maj. Kurt C. Reiting, "Command and Control for Third Wave Warfare," *Army*, February 1995, p. 12.
33. Arthur Knoth, "March of the Insectoids," *International Defense Review*, November 1994, p. 58.
34. Warden, "Non Lethal Concepts of Operations," p. 6.
35. The qualitative change from the Corporate to the Modern subepoch (experimental to institutionalized engine-based energy) took more than a century to occur; generalized calculations are difficult because each nation-state followed its own developmental path.

36. Metz and Kievit (*The Revolution in Military Affairs and Conflict Short of War*, p. vii) are in the minority of scholars when they ask questions such as, "What is the ethical dimension of the RMA?" or "What is the impact of the RMA on the structure of U.S. national security organization?"
37. Chris Morris, Janet Morris and Thomas Baines, "Weapons of Mass Protection: Nonlethality, Information Warfare, and Airpower in the Age of Chaos," *Air Power Journal*, Spring 1995, p. 27.
38. Discussion with Dr. Edward P. Scannell.
39. The crossbow, arquebus, field artillery, and machine gun were all considered inhumane and unethical when initially used on the battlefield because they violated the prevailing norms (i.e., rules of behavior) regarding how war is conducted. Ethical codes in each instance were based on less advanced military technology.
40. Advances in organ harvesting and the growth of organs in laboratories may possibly negate such an ethical debate. On the other hand, the moral ramifications of such technologies might create a debate which makes current abortion/right-to-life issues pale in comparison.
41. Primarily physical and mental. Long-term perceptual incapacitation is highly sophisticated and almost unnoticeable; see de Caro's "hypothetical use" of Software by Porpetta against the United States.
42. Metz and Kievit (*The Revolution in Military Affairs*, p. 29) are also concerned with the ethical ramifications of the RMA.
43. The same argument for the need for a broader RPMA concept has been made concerning the dual development of the RMA in the West and the rise of non-Western warfare. See Robert J. Bunker, "Rethinking OOTW," *Military Review*, November-December 1995.
44. Metz and Kievit (*The Revolution in Military Affairs*, p. 28) note that "Currently, there is no accepted definition of RMAs or even agreement on which historical transformations constituted revolutions." We argue, however, that Fourth Epoch War theory currently provides the most developed historical analysis of this subject matter.