STRATEGY RESEARCH PROJECT

THE SOLDIER-CYBORG TRANSFORMATION: A FRAMEWORK FOR ANALYSIS OF SOCIAL AND ETHICAL ISSUES OF FUTURE WARFARE

BY

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ABSTRACT

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Combining man and machine to enhance innate soldier capabilities is the hallmark of a soldier-cyborg transformation. Increasing the man-machine interface in the unpredictable environment of war has enormous potential to change the human dimension of war. This paper discusses the issues of values, ethics, and leadership concerning technologically advanced armed forces as they move warfare into the unfamiliar world of the cyborg.

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PREFACE

War remains society's worst scourge. As the military arm of the world's superpower, the armed forces of the United States must be prepared to set and enforce the ethical and moral standard in war.

This paper is written as a part of the Army After Next Program at the United States Army War College. It represents an integration of my personal experience, expertise, and research on the soldier-cyborg phenomenon and the effect of cyborgization on warfare in the time frame of the Army After Next, 2025-2030 AD.

ENHANCING, TRANSFORMING AND TRANSCENDING

...the soldier's heart, the soldier's spirit, the soldier's soul, are everything.

George C. Marshall

War is a human event, but because human beings are fundamentally frail and incapable, the armed forces expend enormous resources attempting to transcend human physical and mental limitations. Social and ethical issues related to enhancing and transforming innate soldier capabilities by combining man and machine is the focus of this paper. A discussion of social trends as they relate to warfare is presented first, followed by a discussion of social and ethical issues surrounding the technological enhancement of innate soldier capabilities.

A cyborg—short for cybernetic organism—is an entity that mixes the machinic and the organic.[1] Cyborg technologies range from restorative to enhancing, and have been used to increase soldier effectiveness. The soldier-cyborg transformation was chosen as the framework for the analysis social and ethical issues of future warfare, because the machinic enhancements of the individual soldier in the physical and informational domains are a major effort of future force development programs, such as

Force XXI. The development and application of cyborg technology is likely to continue, and cyborg-soldiers will undoubtedly be a part of the Army After Next (AAN). How this transformation will affect the moral domain of warfare raises important social and ethical issues.

TRENDS AND PREDICTIONS ABOUT FUTURE WARFARE

The human dimension of war will be decisive in the campaigns and battles of the future just as it had been in the past.

FM 100-5, Operations, 1986

Warfare is executed in three domains: physical, informational, and moral.[2] Throughout history, innovation in warfare technology helped to define the ways in which wars were waged in these three domains. Most technological developments in warfare have been geared toward enhancing physical dominance through increased lethality and survivability; however, as the 21st Century approaches, the emphasis is shifting to the development of technology in the informational domain, with greater dependence on machine interface even for the individual soldier. Continued technological enhancements affecting the physical and informational domains of warfare are a certainty; however, the effects of cyborgization, the mixing of the machinic and the organic, on the moral domain are not readily predictable. Even more uncertain, is how changes in the moral domain affect the human dimension of warfare.

The importance of the moral domain of warfare is well recognized. Machiavelli felt that moral obligation was one of

the strongest incitements to courage.[3] Napoleon said that "In war, the moral is to the material as three to one."[4] Similarly, Clausewitz, states, "do not limit yourself to the physical force, but the moral element must also be considered."[5] A working definition of "moral" for this paper is a sense of social interest. Morals are that which allows one to consider interests, other than self-interests, in determining conduct.[6]

Since the concepts for future warfare are derived from historical experience, a discussion of the influence of a soldier-cyborg transformation on the moral domain of warfare must start by first identifying historical trends relating to the human dimension of warfare.

There are three ways of thinking about historical trends of human events: chaotic, cyclical, and linear. Under the chaotic view, events are seen as occurring randomly with no cycle or pattern, while cyclical theorists view events as occurring in repetition, creating a pattern. Linearists view occurrences as a sequence of events with each event linked to its predecessor on a continuum. At the moment, American thought on these trends is wedged somewhere between chaoticism and linearism. However, cyclical thinking is perhaps best suited to discussing the nature of war, because war is described as occurring in repetitive

patterns or cycles. Cyclical thinking meaningfully and rationally links history to the rhythm of life, both of which are punctuated by war.

Cyclical thinking provides rationale for the determination that each generation feels a historical urgency, which becomes a pattern, or "cycle", reoccurring about every eighty to one hundred years.[7] Several scholars attribute the war cycle to generational experience and the remembrance of the atrocities of war. Thus, the son of a warrior is prejudiced against war, but the grandson views war as romantic. Remembrance of things past is an extremely important part of our present and our expectations of the future. Although the remembrance of war is intended to reduce the reoccurrence of war, remembrance of the inherited traditions of war may actually have an opposite effect and create expectations for future wars.[8]

The generational cycle of war highlights the importance of preserving and memorializing the atrocities, not the glory, of war for succeeding generations. The United States Holocaust Memorial Museum is an example of such memorialization, lest future generations romanticize cultural conflict and forget the atrocities of the holocaust.[9]

Advocates of cyclical thinking believe the theory foretells a global war in the first quarter of the twenty-first century; looking 80 years beyond the end of the last global war in 1945, the year 2025 appears to represent a reasonable projection.[10] This brings us to question the role of chaos and linearism on the cyclical nature of war and to investigate the ability to disrupt the cyclical trend of warfare. Chaos in history is considered a disruption of the cycles by linearism. Linearism requires an identification of where history should go and interventions to get there. If global war becomes more probable as global order decays, then emphasis on shaping the global order to preserve peace, as advocated by the most recent Quadrennial Defense Review (QDR), is not misplaced.[11]

Since the ultimate purpose of war is to attain a better peace, society seeks first to maintain peace, and in the alternative, to wage war in morally acceptable ways. According to classic military theory, in war opposing forces seek to defeat the opponent's strategic center(s) of gravity—the hub of all power on which everything depends. Opposing forces must impose their will on the center of gravity if victory is to be achieved.[12] The dilemma faced by military strategists is that

most strategic centers of gravity are not amenable to defeat by military intervention without widespread destruction.

The will of the people is often identified as a strategic center of gravity. The will of the people can be considered to represent the willingness of society to expose its younger generation to harm and possible death balanced against the willingness to accept responsibility for the deaths inflicted on the opposing society in an effort to achieve a better peace. This implies that the use and extent of force must be supported by the will of the people.

Consideration of the dramatic change in attitudes about warfare over the last two centuries is important when considering the will of the people in future wars. As Brodie states:

> Where war was once accepted as inevitably a part of the human condition, regrettable in its tragic details but offering valued compensations in opportunities for valor and for human greatness—or, more recently, in opportunities for the ascendancy of superior peoples—the modern attitude has moved towards rejection of the concept of war as a means of resolving international or other disputes.[13]

In warfare, the loss of human lives dominates everyone's thoughts; both during and after the conflict.[14] Since strategic surprise and rapid strike forces are at the core of the AAN, it seems unlikely that there will be time to obtain more than an

administrative consensus prior to execution of a conflict. This raises an important strategic issue about the necessity to gain the will of the people to wage war when the anticipated loss of life is minimal. The challenge to future war planners is determining how to defeat opposing centers of gravity, such as the will of the people, without widespread loss of life. Thus, low lethality weapons and distant applications of precisely-applied force are mandatory to make future conflicts morally acceptable.

CHANGING DEMOGRAPHICS

Since willingness of society to expose its younger generation to harm and possibly death is a consideration in waging war, demographics will clearly be an influence. Demographic projections indicate a diminishing source of American males during the next 25 years. Americans are living longer,[15] having fewer children per family,[16] and of the children born, fewer than expected are male.[17]

Similar to the United States, all the mature industrial countries are aging, and have experienced a significant decrease in the proportion of males born over the past three decades.[18] Projections are that Japan will go from being the youngest to

being the oldest of the seven largest industrial nations by 2020. Germany, which is already quite old, will continue to get older at about the same rate as France, Italy and Canada.[19] In addition, fertility rates in all the industrial nations is below replacement rates, with the exception of one country, Sweden, and this trend is expected to continue. These trends are starting to evolve in some "developing" countries as well, such as South Korea and Taiwan. China, a demographic oddity as a poor country with a low fertility rate, is expected to experience an even further decline in the birth rate as it grows richer.[20]

The shift in the age and sex distribution of the population resulting from longer life, fewer children, and fewer males among those children will directly change the composition of the labor force. For the industrial society, it will mean a relatively smaller base of workers, particularly male workers, to finance programs for non-workers. It seems reasonable to predict that in the future, males under 45 years of age will be the most valued segment of society. Industrial societies will not be able to tolerate loss of this valued cohort in combat, which further supports the requirement for low lethality to make future conflicts morally acceptable.

THE BIOLOGIC SHIFT

Recorded human history can be divided into four main anthropological divisions or ages: (1) hunter-gatherer; (2) agricultural; (3) industrial; and (4) informational. The latest, the informational age, began with the discovery of the microprocessor. Although the informational age is the shortest in duration, it contains more explosive shifts in science and technology than all previous periods combined.[21] Cyborgization had its birth during the beginning of the informational age.

America is now entering what has been referred to as the biological age, where the healing power of time is replaced by haste and the power of time-outside-nature. Previously, we prized the ability to divine nature's energy and use it, but during the biological age, we will prize the ability to defy nature's energy and overcome it.[22] By 2005, the Human Genome Project will have transcribed the entire programming code of human life. This and other anticipated advances in medical technology will present the opportunity for directly altering humans, both physically and mentally. Enhancement of desirable human attributes through biologic alteration and cyborgization has potential to affect military selection, training and leader development. Machine control of cyborg systems interconnecting

battlefield elements, enhances survivability and predictability in combat. Enhanced survivability and predictability decreases loss of life and increases the opportunity to execute war with minimal requirements for gaining the will of the people. These are some of the reasons the soldier-cyborg transformation is gaining favor.

STRATEGIC IMPLICATIONS OF THE SOLDIER-CYBORG TRANSFORMATION

In spite of the advances of technology, the worth of the individual man is still decisive.

FM 100-5, Field Service Regulations, 1944

Changes in the technology of warfare leads to change in the moral character of war. As technology evolves to further integrate man and machine into cybernetic organisms, we are presented with a new realm of warfare. Evaluating the ethical and moral issues surrounding these changes is necessary as we move into the unfamiliar world of the cyborg.

ON VALUES

A social phenomenon gathering inertia is the increased interactive use of computers and the internet. A growing dependence on the man-machine interface is leading to a generation of computer-oriented individuals comfortable with depending on machine logic for education, information, and enjoyment—a further step toward cyborgization. Although this generation has much to gain from the exploration of the new frontier of cyberspace, there are equally heavy losses experienced in other areas. The obsession with cyberspace

creates an abstraction through which inner human qualities, such as personal respect, and other core values disappear, and an anthropomorphism results that confuses technical capabilities with human qualities.[23]

In the past, military core values were mirrored, to some extent, by American general societal values, but that reflection is becoming less clear. The cyberspace phenomenon is partially responsible for a rift developing between traditional American military values and general societal values. As society becomes more oriented toward the individual, and less altruistic, there is concern that the chasm between traditional military and general societal values will increase. The growing disparity is cause for concern to those charged with peopling the fighting force. Their challenge is to transition young Americans from a fragmented civilian society centered on individualism into a cohesive military force suffused with core military values. Doing this requires values modification. A part of the need to develop core military values is to establish a moral obligation in the military and a bond between soldiers. Recognizing this disparity and identifying the need to spend more time developing military core values in new recruits, the Army is extending Basic Combat Training (BCT) by one week at an enormous expense.[24]

It is important to consider the long term consequences of values modification in the military. Ricks points out that the first thing Marines do in their training is strip away the varied civilian values and replace them with a new set of values based on the culture, history, and traditions of the Marine Corps. As a result, the young enlisted force is becoming detached from the society it represents, and is indoctrinated to "give off a strong sense of disdain for the very society they are sworn to protect."[25] The effect is a military filled with people who do not perceive themselves to be a part of society, but rather a unique segment of society viewed by its members as being better than society as a whole. According to the Commandant of the Marine Corps, General Charles Krulak, "Unless there is a change in this nation, this problem is going to manifest itself in larger proportion as we go along."[26]

Exacerbating the rift between the military and society is the growing ignorance of military affairs among American policy makers.[27] Post-Cold War reductions of the active military are partially fueled by America's disdain for a large peacetime standing armed forces and partially because of a growing rift between policymakers and the military.

The evolving leadership role of the United States as the world's only superpower is unprecedented in American history. Coincident with this leadership role are responsibilities for maintaining global order, and these are dichotomous to the political demands for a smaller active military component. Continued use of a smaller semiautonomous military force to execute national strategy through smaller scale contingencies (SSC) that are not clearly supported by the will of the people may serve to widen the gap between military and societal values. To suffuse military values throughout society and to meet the dichotomous demands of a smaller active component tasked with increased deployments, the DOD plans to increase the use of the Guard and Reserve.[28] The use of the Guard and Reserve in this manner suffuses societal values into the armed forces and reduces the likelihood of developing a military social elitism, but may result in a compromise of core military values int the armed forces.

Selection and value modification techniques available in the future may render values disparity inconsequential. The initial phase of force development is recruitment and selection of individuals with desirable traits. Current techniques used to identify these individuals include personality and intelligence

testing, recommendations, and background evaluations. In the future, selection is likely to be based on genetic composition and potential for values modification. The genomic information available from the Human Genome Project will increase the capability to identify individuals with the biochemical determinants most amenable to genetic enhancement and values modification.[29] A fundamental issue under current consideration is whether it will be possible to change or enhance specific characteristics.[30] Enhanced individuals will possess some advantage over the non-enhanced, but because complex human traits, such as creativity, sociability and leadership, are so tenuously related to genetics, that efforts to genetically enhance such traits will probably be fruitless.[31]

The second phase in force development is training, which includes values modification. Current techniques for values modification include separation, isolation, deprivation, indoctrination and education. A fundamental ethical issue is whether such values modification techniques violate the principle of autonomy. Autonomy is grounded in Kant's notion of the individual's free will and ability to reason. Consistent with the societal values shift to the individual, the relative importance of autonomy is predicted to increase over the next two

decades.[32] To have choices made by others will be considered an insult to one's own reason and unique individuality. A long-term risk of values modification is that soldiers will be unable to exercise autonomous choice, and lead to a new generic class of soldiers without social awareness.

In the future, it may be possible to change the value system as needed on a short term basis to complement specific missions through a temporary override of autonomy. The potential for temporarily changing an individual's value system emphasizes the importance of understanding the relationship between consciousness and causality. According to current quantum theory, consciousness is causal, and it is "how we observe that creates the reality we perceive." This includes how we perceive physical reality, security, happiness, God and other fundamentals of life.[33] Changing consciousness through cyborgization could provide the opportunity to redefine every aspect of life, which brings into question whether existing moral and ethical constraints are sufficient to curb the potential for abuse.

ON MORALS AND ETHICS

The human misery of war and the fact that man is the only animal given to war upon his own kind are well recorded. Yet, no clear parameters for just and unjust war exists.

The perceived morality of killing is demonstrated by evaluating the conceptual roots of the strategic bombing of civilian populations, which have their origin in humane thought. Appalled by the carnage of trench warfare, the Italian General, Giulio Douhet believed that air power offered a better and more humane way to wage war, because terrorized civilian populations would quickly compel their governments to surrender to minimize casualties.[34] Given the emphasis on minimizing civilian casualties in recent wars leads one to question whether the same willingness to take the battle to the civilian population will exist in future warfare.

The shift from the use of combat engagements to the deterrent threat of annihilation was considered a revolution in the history of American military policy.[35] The revolution resulted from the development of weapons of mass destruction (WMD) capable of destroying entire populations of cities at once; yet, given the current attitude about the use of chemical and biologic weapons, one must question the deterrent value of WMD. With perhaps the

exception of nuclear deterrence, the use of WMD will probably be considered an unacceptable use of force in future wars. Even the use of nuclear weapons is controversial.

Another interesting example of how inhumane acts can be morally based is demonstrated by examining the use of human experiments in the Nazi death camps. Although many of these experiments were designed to save the lives of German soldiers and pilots, there is general agreement that the German death camp exterminations and the human medical and scientific experiments exceeded moral boundaries. The emergence of medical ethics, or bioethics, as a discipline began after W.W.II as a direct result of the human experimentation and impersonal killing in the Nazi death camps forcing public awareness of the value of life.[36] The complicity of the German medical profession in the 26 different types of human experiments conducted in the death camps led the world's medical associations to develop strong national and international rules governing scientific and medical experimentation on human beings and guidance for conduct in the face of political pressure. The hypocrisy associated with a collective activity, such as the death camp experiments, is that the individuals involved generally maintain a moral code which makes the action an outrage to their individual conscience.[37]

One assumption behind establishing rules is that professionals who know what is ethical will not behave in immoral ways. Therefore, achieving ethical standards in warfare must allow for the expression of latent individualistic moral capacity, even when in conflict with collective action or political pressure.[38]

Preoccupation with the recurrence of war has led to the developments of customs and codes to limit wanton destruction and violence. Effective restraints now require humane treatment of prisoners and the avoidance of certain types of weaponry and of certain kinds of targets.[39]

Since formal ethics teaching is frequently a part of military training programs, a brief review is presented. Moral behavior in war is derived from four perspectives: (1) an ethical perspective based on secular and religious traditions and philosophy; (2) an ethical standards perspective learned through history; (3) an ethical problem perspective not resolvable by application of ethical standards; and (4) a policy perspective assuming the ability to judge the standard.

Deontological and teleological ethical principles form the basis for ethical decisions. The deontological is an extreme of ethical thought against which other ethics can be measured. It relies on principles of duty, universal law, and rules based on

consensus of essential facts. It focuses on what is "right" not "rights." The right is what one ought to do. The oughts are the *a priori* laws which are reached partially through reason. If one follows the ought, without exception, the most moral decision will be reached. Consequences are not a part of the plan. Deontologic thought represents an individualistic ethic, in that the individual is the end of all action, never the means. It is reason, not emotion, that governs this ethic. Since it is reason that allows the free use of will to choose between good and evil, reason and free will are inextricable from deontologic ethic.

The teleological (utilitarian) ethical principle is juxtaposed to the individualistic deontological ethic. By definition, it is an end-oriented ethic, represented by the maxim "the greatest good for the greatest number." This theory of ethic is concerned with the society, the group, the masses, or even the whole world. This is an ethic that expects to be able to predict consequences. Reason will allow the calculation of what will be beneficial or "good" for the many. In this utilitarian ethic, "good" may not equate with "right". A flaw in the utilitarian ethic is the difficulty in defining "good", with the result that the decision may make the majority feel good, yet

at the same time leaves a minority feeling bad. Complex multifaceted issues are not susceptible to utilitarian solutions.

Reinhold Niebuhr, a 20th century ethicist, tries to find a median point between the "right" and the "good". He states that an ethical decision maker (1) must first be able to respond, then (2) must make an interpretation of the issues at stake, (3) be accountable, making the reaction of others in the community a part of the individual's reactions, and (4) have social solidarity when the decision is implemented through a continuing discourse or interaction within the relevant community.[40] The drawback of taking the community's values into account is the potential for no decision being made, but merely a common denominator with no one fully comfortable. This approach has no absolute corrective and no absolute higher authority, law, or value system to which to appeal, and morals can become an infinite regression, without any ending or beginning moral point.

Max Weber, a sociologist interested in the ethics of decision making and the need to take responsibility for the consequences of one's actions, feels that the ethics of ultimate ends is responsible for most of the bloody events taking place in the Germany. Weber states that there are three criteria for ethical decision making: (1) passion; (2) an ability to distance oneself

from the problem; and (3) a sense of responsibility. Weber states "decisions are not made with the head alone, but with the heart." Weber admits the need for some moral absolutes, but only as a last resort. Absolutes in ethics and morality are dangerous because they lead to nonnegotiable positions, yet without them, there is a relativism that allows for no moral starting point and no appeal to higher authority.

Another ethical school of thought influencing ethical decision making is the "doctrine of the double effect" developed over centuries by Catholic theologians in an effort to make canon law more amenable to actual human predicaments. This doctrine attempts to justify certain actions that indirectly produce certain evil consequences. Four basic principles must be justified: (1) the action, by itself and independently of its effect, must not be morally evil; (2) the evil effect must not be a means to producing the good effect; (3) the evil effect is sincerely not intended, but merely tolerated; and (4) there is a proportionate reason for performing the action, despite its evil consequences. In using this kind of logic, formally called sacuistry, secular and religious ethicists are able to respond to particular human situations while still holding to firm general principles. This method is useful for identifying the moral

dilemma, which is the first step in attempting to solve the problem. A method being advocated above all others is the use of supplements, not contrasts, between absolutes and relativities.

The blurring of ideological divisions may be conducive to generating and sustaining discipline, but putting an end to ideology is incompatible with democratic aspirations. In a democracy, ideological exchange serves a valuable function by educating people and alerting them to visions of what is "right" and "just". Care must be exercised to ensure cyborgization threaten autonomy, which is critical to ethical decision making. As mentioned, cyborgization.

Cyborgization may actually enhance ethical considerations, particularly if the cyborg-soldier feels secure in his capabilities. By possessing survivability and lethality that are relative to the perceived threat, the cyborg-soldier will be better able to react in an ethical manner . Soldiers must have the flexibility to react to the varied Kafkaesque situations encountered in combat. It is important to develop the flexibility to kill, yet and at the same time, recognize the sanctity of life.

Soldiers must retain the flexibility to make morally correct decisions, particularly in the close range fight. An example of

this flexibility is demonstrated by the Special Operations Forces (SOF) soldiers in a hide sight deep in Iraq during DS/DS who were discovered by a little girl and an old man. The soldiers experienced a momentary dilemma of whether to kill the girl and the old man or risk being killed. They chose not to kill the girl and the old man, and as a result, it was necessary to kill many more people and jeopardize the lives of their fellow soldiers. Would killing the little girl and the old man have been the morally correct action, given the desire not to target civilians, particularly women and children?[41] Their conclusion was probably no, given the premise that civilians, particularly children, were not appropriate targets.

ON LEADERSHIP

Force XXI marks the beginning of a growing dependence on machine logic, and a move closer to cyborgization in the military. As a result, the most important changes in the post-Force XXI era will include the interconnectiveness of individuals, groups, and organizations through networks; the compression of time; and demassification. Because networks are decentralizing and anti-hierarchical, they tend to leach power

from traditional institutions. This will create increased leadership challenges in the AAN.

Leaders facing the challenge of cyborgization must develop and foster a consciousness in themselves and those they lead above that which is computed automatically. Situational freedom of choice must remain an inherent leadership capability. Although freedom to choose reduces predictability, it provides meaning to responsibility. In the absence of freedom of choice the manipulable emptiness of the informational machine prevails. Although machine logic is human-derived, the derivation is adapted to comply with the machine's imperatives. Very few ideals survive this process.[42] In a technologically-dependent armed forces, moral strength and technological capability are traits that will best serve leaders.

ON KILLING

Technological capability alone does not always provide a strategic or operational edge. Research and development can provide new weapons, but unless society approves, they are useless.[43] The recent history of U.S. policy toward the use of directed energy weapons, in particular, anti-personnel lasers illustrates the impact of societal opinion on the use of new

technology. Initially, U.S. policy supported the use of laser electro-optic countermeasures, because defeating the human visual system with lasers to incapacitate enemy forces was considered a more humane alternative to total destruction from ballistic weapons.[44] Due to pressure from international opinion, fueled by the International Committee of the Red Cross (ICRC), the U.S. changed its policy and ceased the development of systems with the potential for damaging vision.[45] Thus, DOD approval of a weapons system capable of inflicting a less than lethal injury was rescinded at enormous expense in response to objections raised by a non-governmental organization.[46]

Future conflict scenarios will most likely involve combatants executing focused engagements with specific objectives.[47] This highlights another enduring Clausewitz quote, "No one starts a war...without first being clear in his mind what he intends to achieve by the threat of war, and how he intends to conduct it."[48] As MacArthur said, "once war is thrust upon us, there is no alternative than to apply every available means to bring it to a swift end. War's very object is victory—not prolonged indecision. In war, indeed there can be no substitute for "victory."[49] The historical goal of victory will persist, but the definition of victory will change. Defining victory in the

smaller scale contingencies (SSC) constituting the recent American experience is difficult to nearly impossible.

More than ever, victory will be dependent on an in-depth knowledge of the psychology and culture of the enemy society and itsleadership. Military leaders must possess psychological, sociological, and anthropological insights, because victory may depend on forced changes of long held cultural and religious beliefs. In limited wars, diplomacy is played out to a greater degree by the military, and all indications are that this trend will continue. As political will is increasingly being executed through a tailored use of force, there is a compression of the strategic, operational and tactical levels of war, expanding the strategic focus of tactical forces.

ON BATTLEFIELD MEDICAL CARE

By 2025, animal or machinic derived replacement organs will be immediately available for transplantation. As prophesied by a Los Angeles Times reader in 1975 during to the Quinlan case debates, "There will come a time when almost any 'fatal' anomaly of human physiology can be circumvented by connecting the body to various combinations of machinery."[50] Achieving this capability

on the battlefield will require forward surgical presence and a restructuring of joint military medical doctrine.

Fatality aversion will play a major role in future conflicts.[51] Casualties are much more effective for increasing the medical burden. Fewer fatalities and more casualties has a profound psychological effect. Tolerance of casualties is increased when the injury is reversible or treatable. Therefore, emphasis must be placed on the treatment of casualties in a way to decrease long-term morbidity.

RECOMMENDATIONS AND PERSPECTIVES

Wars will be won by men and women, not machines.

—Summers, *On Strategy II*, 1992

Recent efforts to increase the man-machine interface herald the soldier-cyborg transformation. These efforts are likely to continue, blurring the differentiation between man and machine. Given a lower tolerance for loss of life and greater precision for the delivery of force, the target on future battlefields may actually be the cyborg systems rather than the human. Incapacitating the system eliminates the ability for humans to effectively wage war in the highly technological environment of AAN.

To prepare for that future, the DOD is charged with the dichotomous tasks of continuing development of cyborg systems to provide enhanced protection, a full range of power projection and increased decision-assisting capabilities, while ensuring that freedom of choice is retained by soldiers and their leaders. This approach will best prepare the U.S. Armed Forces for executing American strategy in asymmetric environments. Research and development of both enabling and disabling technologies must

be emphasized; in particular, disabling technologies yielding medically reversible effects.

More importance is being placed on the military's ability to shape the global environment, particularly in defending the vital interest of maintaining world peace. A lower tolerance for loss of life, will lead to an increased use of robots, unmanned air and ground vehicles, and other unmanned warring devices.

Tomorrow's leaders are here today, and the influences that affect them can provide insight into the future. There will be a smaller Officer Corps, with greater emphasis on a more highly educated NCO Corps. Commissioned and Non-commissioned Officers must be politically and culturally astute. They will need an expeditionary mindset and the ability to execute a simultaneous strategic and tactical offense aimed directly at destroying the enemies political will to fight.

Because of the cyborg transformation, future forces will require an enhanced medical infrastructure. A strong recommendation is made for establishing a Joint Staff Surgeon General to: advise the Chairman; work directly with the Assistant Secretary of Defense for Health Affairs and the Defense Medical Programs Activity; coordinate the service Surgeons General; and oversee the medical and ethical permutations of the soldier-

cyborg transformation. This recommendation is made, because defining the point at which technology enhancement exceeds ethical practice is an important strategic issue that warrants continuous consideration at the joint staff level.

WORD COUNT: 5,603

ENDNOTES

[1] The world's first being to be called a "cyborg" was a white laboratory rat at New York's Rockland State Hospital in the late 1950s with a tiny osmotic pump implanted in its body to inject chemicals at a controlled rate to alter its physiologic parameters. Donna J. Haraway, "Cyborgs and Symbionts: Living Together in the New World Order," in The Cyborg Handbook, ed. Chris Hables Gray with the assistance of Heidi J. Figueroa-Sarriera & Steven Mentor (New York, NY: Routledge, 1995), xi.

[2] Department of the Army, Operations, Army FM 100-5 (Washington, D.C.: U.S. Department of the Army, 5 August 1997), 2-8.

[3] Felix Gilbert, "Machiavelli: The Renaissance of the Art of War," in Makers of Modern Strategy:: From Machiavelli to the Nuclear Age, ed. Peter Paret, Chapter 1, (Princeton, NJ: Princeton University Press), 26.

[4] Napoleon I, quoted in Dictionary of Military and Naval Quotations, ed. Colonel Robert Debs Heinl, Jr., USMC (Ret.). (Annapolis, MD: U.S. Naval Institute, 1966), 196.

[5] Carl von Clausewitz, On War, ed. and translated by Michael Howard and Peter Paret (Princeton, NJ:Princeton University Press, 1976), 97.

[6] Reinhold Niebuhr, Moral Man and Immoral Society, (New York, NY: Scribners, 1960), xi.

[7] William Strauss and Neil Howe, The Fourth Turning: An American Prophecy, (New York: Broadway Books, 1997), 3-20.

[8] Bernard Brodie, War & Politics, (New York, NY: Macmillan Publishing Co., Inc., 1975), 227.

[9] The primary mission of the United States Holocaust Memorial Museum is to advance and disseminate knowledge about this tragedy and to encourage visitors to reflect upon the moral and spiritual questions raised by the events of the Holocaust as well as their own responsibilities as citizen of a democracy.

[10] Strauss and Howe, 51-53.

[11] Department of Defense, Report of the Quadrennial Defense Review, (Washington, D.C.: U.S. Department of Defense, May, 1997), 9.

[12] Clausewitz, 595-596.

[13] Brodie, 274.

[14] Walo Von Greyerz, Psychology of Survival: Human Reactions to the Catastrophes of War, (Amsterdam: Elsevier Publishing Company, 1962), 13.

[15] In the United States, the fastest growing segment of the population are people over the age of 85. By 2010, the fastest growing age group will be 65 and older. Americans age 65 and older will represent over 20% of the total population by 2035—a dramatic change from 7.5% in 1945 and 13% in 1996. Robert B. Friedland, "Demographic, Economic, and Health Factors Likely to Affect Public Policy," Journal of Long-Term Home Health Care 15 (Fall 1996): 24.

[16] In 1990, fertility rates were about half of what they were at the peak of the baby boom in 1955. During the 1980s, married couples without children became more numerous than married couples with children. Bureau of the Census, Statistical Abstract of the United States: 1995, (Washington, D.C.: U.S. Department of Commerce, 1995), 54-57.

[17] It is well known that male fetuses are more susceptible to reproductive hazards and have a higher rate of birth defects than females. Since 1970, male births in the United States have declined by one birth per 1,000, resulting in approximately 38,000 fewer males than projected. Devra Lee Davis, Michelle B Gottlieb, and Julie R. Stampnitzky, "Reduced Ratio of Male to Female Births in Several Industrial Countries," Journal of the American Medical Association 279 (1998): 1018.

[18] Davis, 1018.

[19] Hamish McRae, The World in 2020: Power, Culture and Prosperity, (Boston, MA: Harvard Business School Press, 1995), 99-100.

[20] Ibid.

[21] John L. Peterson, The Road to 2015: Profiles of the Future, (Corte Madero, CA: Waite Group Press, 1994), 6-9.

[22] Strauss and Howe, 10.

[23] Stephen L Talbott. The Future Does Not Compute: Transcending the Machines in Our Midst, (Sebastopol, CA: O'Reilly & Associates, Inc., 1995), 6

[24] Based on the remarks made by a speaker participating in the Commandant's Lecture Series.

[25] Thomas E. Ricks, Making the Corps (New York, NY: Scribner, 1997), 22.

[26] Ibid., 38.

[27] Ibid., 23.

[28] The Honorable Deborah R. Lee, Assistant Secretary of Defense for Reserve Affairs, "Reserve Components—Unequivocal Commitment," Reserve Officer Association National Security Report, March 1998, 39.

[29] Albert R. Jonsen, "The Impact of Mapping the Human Genome on the Patient-Physician Relationship," in The Human Genome Project and the Future of Health Care, ed. Thomas A. Murray, Mark A Rothstein, and Robert F. Murray, Jr. (Bloomington, IN: Indiana University Press, 1996), 7.

[30] Thomas H. Murray, "The Genome and Access to Health Care: Two Key Ethical Issues," in The Human Genome Project and the Future of Health Care, ed. Thomas A. Murray, Mark A Rothstein, and Robert F. Murray, Jr. (Bloomington, IN: Indiana University Press, 1996), 220.

[31] Ibid.

[32] Ibid., 234.

[33] Peterson, 17-18.

[34] Harry G. Summers, Jr., On Strategy II, A Critical Analysis of the Gulf War (New York: Dell Publishers, 1992), 98.

[35] Russell F. Weigley, The American Way of War: A History of United States Military Strategy and Policy (New York: Macmillan Publishing Company, 1973), 365-368.

[36] Arthur L. Caplan, "How Did Medicine Go So Wrong? Is Moral Inquiry into Nazi Crimes Immoral?", in When Medicine Went Mad: Bioethics and Holocaust, ed. Arthur L. Caplan, (Totowa, NJ: Humana Press, 1992), 64.

[37] Niebuhr, 8.

[38] Ibid., xxv.

[39] Brodie, 228.

[40] Niebuhr, 224-282.

[41] Douglas C. Waller, The Commandos: The Inside Story of America's Secret Soldiers, (New York, NY: Dell Publishing, 1994), 366-380.

[42] Talbott, 3.

[43] Summers, 256.

[44] In compliance with the Department of Defense Instruction 5500.15 (Review of Legality of Weapons Under International Law), the Judge Advocate General of the Department of the Army, issued the Memorandum of Law on the use of lasers as antipersonnel weapons on 29 September 1988. The conclusion of this memorandum states that "the use of lasers as antipersonnel weapons would not cause unnecessary suffering nor otherwise constitute a violation

of the international legal obligations of the United States. Accordingly, the use of a laser as an antipersonnel weapon is lawful." This memorandum is reprinted in its entirety in Department of the Army, Memorandum of Law: The Use of Lasers as Antipersonnel Weapons, The Army Lawyer, DA PAM 27-50-191 (Washington, D.C.: U.S. Department of the Army, November 1988), 3-4.

[45] On 1 September 1995 Secretary of Defense William Perry signed the new DOD policy on blinding laser weapons, which stated that "The Department of Defense prohibits the use of lasers specifically designed to cause permanent blindness of unenhanced vision and supports negotiations prohibiting the use of such weapons...Therefore, we continue to strive, through training an doctrine, to minimize these injuries." This new policy was signed just weeks prior to the Certain Conventional Weapons Conference (CCWC) in Vienna, Austria that was being convened to discuss the use of anti-personnel lasers and land mines. Department of Defense, DOD Policy on Blinding Lasers, Policy Reference Number 482-95 (Washington, D.C.: U.S. Department of Defense, 1 September 1995).

[46] CCWC proceedings, Protocol IV, Article I state that "It is prohibited to employ laser weapons specifically designed, as their sole combat function or as one of their combat functions, to cause permanent blindness to unenhanced vision..." As a result, the DOD terminated the Laser Countermeasure System (LCMS) and the Stingray programs. See Memorandum for Deputy Secretary of Defense from the Secretary of the Army (5 October 1995) informing him of the termination of the Army's LCMS program in compliance with an OSD decision packet. Department of the Army, Decision to Terminate the Laser Countermeasure System Program, Memorandum for Deputy Secretary of Defense (Washington, D.C.: U.S. Department of the Army, 5 October 1995).

[47] Raymond Aron, "The Concept of Industrial Society," in World Technology and Human Destiny, ed. Raymond Aron, (Ann Arbor MI: The University of Michigan Press, 1963), 61.

[48] Clausewitz, 579.

[49] Made in his April 19, 1951 address to a joint session of Congress. Douglas MacArthur, Reminiscences, (New York: McGraw-Hill, 1964), 404.

[50] M.L. Tina Stevens, "The Quinlan Case Revisited: A History of the Cultural Politics of Medicine and the Law," Journal of Health Politics, Policy and Law 21 (Summer 1996), 350.

[51] Steven Metz, "Which Army After Next? The Strategic Implications of Alternative Futures," Parameters 27 (Autumn 1997), 19.

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