Notes

Introduction

1. The use of mass rape as a conscious policy by military units, as in the Balkans (Tax, 1993; Dobos, 1993) and in Iraq (Makiya, 1993) is hardly a new war strategy but it seems to be increasing. Feminist theorists who link this resurgence of one of the most ancient and horrific aspects of war to a general crisis of patriarchy and a particular crisis in war are very much on the mark (Enloe, 1993).

2. The good Harvard professor sees the era of modern wars between nations and ideologies as passe. Future conflicts, according to him, will be between the eight major “civilizations” of the world: Western, Confucian, Japanese, Islamic, Hindu, Slavic Orthodox, Latin American, and African. This bizarre, atavistic, and cartoonish theory has “hit a vein” Huntington admits, and it may well propel the old Cold Warrior to mass culture stardom (Chronicle of Higher Education, 1994, p. A10).

3. The information in this section comes, appropriately enough, from the Internet—specifically from a series of postings forwarded by the Austin (TX) Comité de Solidaridad con Chiapas y México, including notes by Joseph Moore (y@igc.apc.org), Harry M. Cleaver (hmcleave@mundo.eco.utexas.edu), and translations from Zapatista bulletins. For more information contact: (Chiaapas96@mundo.eco.utexas.edu).

4. In this book I hope to explain contemporary war and show its relationship to postmodernity in general. To this end there will be several extensive attempts to define and explain both the specific elements of postmodern war and the general idea of the postmodern, starting in Chapter 1.

5. “One can no longer distinguish between technology on the one hand and theory, science and rationality on the other. The term techno-science has to be accepted” (Derrida, 1984, p. 12). In the case of military computing the term “technoscience” seems quite applicable and I will be using it (without the hyphen) unless I am pointing to something specifically within science or engineered technology, but not both.

6. He in this case but not in feminist science fiction, where the cyborg is often a she.
Chapter One

1. The postmodern soldier would say, “Victory in war can only be based on the latest information.” Is this the same information?


3. Calling the United States the “only” superpower in the post-Cold War era is dangerous. Actually, in terms of either economic (constructive/coercive) power or purely military (destructive/coercive) power or both, there are now dozens of superpowers in the world, including a number of multinational companies. The United States has a special position, certainly, but is hardly omnipotent, not even in culture, where it is strongest. Still, it is not insignificant that U.S.-based companies are reporting record profits and foreign investments ($33 billion in the first half of 1995, up 27 percent over the previous record year, 1993) as the Pax Americana gets on its way. See Allen R. Myerson, “U.S. Firms: The Worldly Shoppers—International Investment Totals Reach Record Levels,” International Herald Tribune, November 25–26, 1995, p. B1. Worldwide international investment for the first half of 1995 was also a new record, $226 billion.

4. On the other hand, some of the theories are far from useful. Baudrillard’s (1991) claim that the Gulf War was merely simulated isn’t helpful even as overblown postmodern rhetoric, as Norris (1994) and Nideffer (1993) among others have made clear. The conceit in Manuel De Landa’s War in the Age of Intelligent Machines (1991) that AI robots are taking over is both technically wrong (AI is very distant, if not impossible) and hopelessly deterministic.

5. This term was initially used by Fredric Jameson (1984) when he labeled Vietnam the first postmodern war in his article “Postmodernism, or the Cultural Logic of Late Capitalism.” Ann Markusen and Joel Yudken (1992) use the same term in their book, Dismantling the Cold War Economy, although their conception of modern war is ahistorically limited to the twentieth century. There is a school of thought (Nadel, 1995; Kellner, 1997) that sees the postmodern break as being precipitated by the Vietnam War but coming after it. In many ways it takes a similar approach to my own, and I am in broad agreement with many of its conclusions.


7. Some infowar advocates see it as being limited to electronic and electromagnetic weapons; others argue that it is the role of information that is important. Different definitions of C^4I^2 war, infowar, netwar, and cyberwar proliferate. The distinctions aren’t important. What is crucial is to see the continuity of these types of war with the long history of low-intensity (LICs) conflicts, on the one hand, and with the existing system of postmodern war, on the other.

8. OOTW was first included in the U.S. Army’s FM (Field Manual) 100-5
military master plan in 1993. In war's crisis war has become as flighty theoretically as Parisian fashion. Robert Bunker's clear critique of OOTW even reaches the point of complaining that operations other than war aren't categorized under the general category of war (1995, p. 40). There is a simmering debate over OOTW and LIC and other acronyms, but no matter how you slice the pie, or what you call it, there are only so many military missions up for grabs.

9. The main historical framework that most infowar theorists use is that of Alvin and Heidi Toffler. For them, infowar typifies the Third Wave of human culture, the information wave as opposed to the industrial and agricultural epochs that preceded it. In their 1993 book War and Anti-War they counterpoise brute force and brain force and hail the spread of cyberwar doctrines, nonlethal technologies, and electronic democracy initiatives. Facile as much of their analysis seems, the general sweep of it is unpleasantly compelling. Even if one accepts that a different schema is better, such as Bunker's four epochs based on energy use (1994), it does seem that the Tofflers' claim that humanity is undergoing a technologically based cultural revolution is all too real.


12. The U.S. Army has Force XXI; the U.S. Navy has its program "Forward . . . From the Sea"; the U.S. Air Force has "Global Reach, Global Power"; and the U.S. Marine Corps has "Operational Maneuver . . . From the Sea." For details see: Col. Richard Szafranski, "A Theory of Information Warfare," Airpower Journal 4, no. 1, Spring 1995; Col. G. I. Wilson and Maj. Frank Bunkers, "Uncorking the Information Genie," Marine Corps Gazette, October 1995, and other articles to be found at Dr. Ivan Goldberg's web site called the Institute for the Advanced Study of Information Warfare: <www.psycom.net/iwarl.html>. The Air Force has taken this furthest with the implementation of the Copernicus Project in 1990. It sets up an infowar architecture for the whole Navy, as is described in "Copernicus Forward 1995," Navy Public Affairs Library.


14. This is a dangerous continuation of the LIC theory that argues that domestic enemies were responsible for the Vietnam War defeat, as is detailed in Chapter 9. Charles Swett (1995), for example, who works for the assistant secretary of defense for special operations and low-intensity conflict, has written a "strategic assessment" of the Internet that focuses mainly on domestic political protesters, although the use of the Internet by the Zapatistas is a major case study, as it is with all of the cyberwar theorists. See also David Corn, "Pentagon Trolls the Net," The Nation, March 4, 1996. For current information on this debate access the Federation of Atomic Scientists' (FAS) excellent site: http://www.fas.org/pub/gen/fas/cp.

15. See http://www.is.in-berlin.de:80/WEBSTOP/CAE/cae_ed1.txt for this and more recent manifestos.

Considered,” March 17, 1996). The United States has also changed its longstanding deployment policy, finally recognizing that experience/information is crucial to survival. Soldiers assigned to the Bosnian mission will be there for the duration (“Deployments Will Be Longer,” Oregonian, March 6, 1996, p. 7).

17. Remy Allouche and Nathalie Bichat, “Multimedia Products Respond to Evolving Crisis Management, Peacekeeping Needs,” official Armed Forces Communications and Electronics Association publication, reprinted from the March 1995 issue of SIGNAL Magazine. There are a number of such network systems for international missions, including Tempo, Pegas, Takom, and Alcatel. Many stress tie-ins to civilian technology such as the Internet in order to influence local events and also to allow soldiers to e-mail to each other and home.


19. In many instances, according to Yugoslav peace activists I’ve interviewed extensively (and who wish to remain unnamed) and Masha Gessen (1995), effective communication among peace activists within the former Yugoslavia has only been possible because of the activist-created computer networks, which continue operating, with difficulties, into 1997.


23. Alvin Bernstein in a speech at the University of Maryland, College Park, July 28, 1990; emphasis added.

24. This paragraph is based on Teresa O’Connell’s 1990 unpublished manuscript, “From Scorched Earth to Scourged Earth: Drugs and Destabilization in Guatemala.”

25. Fort Monroe, Virginia, August 1, 1986. Only Vol. 1 is available for analysis, however, as Vol. 2 is “Top Secret.” All subsequent quotations in this section are from Vol. 1 of this review unless otherwise noted; their page numbers will be given in parentheses.

Chapter Two

1. Throughout this chapter I will use various names for the 1990–1991 conflict between Iraq and the alliance of Kuwait, the United States, Egypt, Saudi Arabia, Great Britain, France, and many others. The war has no official or accepted name as yet, so it seems appropriate and interesting to try and use those I’ve heard. My personal favorite is “The War to Restore the Rightful Dictator of Kuwait.”
2. Film from the Apaches taken during the U.S. invasion of Panama is still being withheld, even from Congress. Congressman Charles Rangel (Dem., N.Y.) suspects that the film shows Panamanian civilians being killed (Rangel, 1991).

3. Originally, the attack on Iraq and occupied Kuwait was to be called Desert Sword, but it was decided to portray the war as more of a natural force. Usually, all military operations are given random computer-generated names, but not in this case, which at least shows some understanding of the limits of computers. Perhaps Secretary of Defense Richard Cheney made the change. He renamed the invasion of Panama Operation Just Cause after the computer gave it the designation “Blue Spoon” (Waller et al., 1990).

4. Estimates vary widely. Iraqi military casualties are put by many different sources at 100,000–200,000, most of whom were untrained conscripts. Direct civilian deaths in Iraq from Allied bombing are put at less than 5,000. Indirect deaths were estimated at 70,000 after one year by the U.S. Census Bureau, with 100,000 more, mainly children, two years after the conflict, according to a Harvard University study. Deaths in the consequent civil war have been put at 20,000–35,000, mainly civilians (Weiner, 1992).

5. In all likelihood this was a decision made out of local enthusiasm, although it could represent a military protest to the precipitous cease-fire. In retaliation for “two rocket-propelled grenades and a single round from a T72 tank” fired at a U.S. patrol (probably by mistake) and causing no casualties, a whole division was savaged (Gordon and Trainor, 1995, p. 429). Under the protection of the truce that the United States called, the Hammurabi Division of the Republican Guard was traveling up Route 8 along the Euphrates River to Baghdad. While it was crossing the Haw al Hammer swamp on an elevated highway, Gen. Maj. Barry McCaffrey’s 24th Mechanized Infantry Division attacked it without warning two hours after the firing incident. Using helicopters, artillery, and armored vehicles, they destroyed hundreds of vehicles, captured 3,000 prisoners, and probably killed thousands of others, all in a matter of a few hours at the cost of one soldier wounded, one tank lost, and one Bradley armored vehicle damaged. Despite standing orders to the contrary, the Iraqis were not warned or asked to surrender. The Pentagon kept the attack from the press at the time by consciously mislabeling it as a series of small actions (Sloyan, 1991; Gordon and Trainor, 1995, p. 429).

6. The main contractors for these systems include IBM, GTE, Honeywell, Computer Science, Unisys, and Boeing. Many other companies are involved as subcontractors, including Lockheed, a key satellite manufacturer, Cisco Systems, Inc., and even Apple Computers, which has installed computers in the National Military Command Center and on helicopters. There were also numerous small specialty companies, such as Rugged Digital Systems and Grid Systems, with computers in the Gulf (Business Week Staff, 1991c, p. 43; Clark, 1991).

Chapter Three

1. There is a difference between the Strategic Defense Initiative (SDI) and Star Wars: SDI was a package of specific programs; Star Wars is the ongoing militarization of space. SDI was a mythological “peace shield” with a specific budget, now ended, although many of the projects live on in other bureaucratic homes. Some leading
Star Warriors, such as the director of SDI research at Lawrence Livermore in the mid-1980s, felt the U.S. military was doing fine in space before SDI. They objected to Reagan's impossible system, not realizing the tremendous political victory his proposal would become [Gen. C. Neil Beer, USAF Ret., director of SDI research at Lawrence Livermore Laboratories, interview (May 19, 1986) and personal correspondence (June 3, 1986)].

2. At the 1987 AAAI (American Association for Artificial Intelligence) conference SDI and SCP were the subjects of much official and unofficial debate. Over 7,000 U.S. scientists pledged not to work on SDI, for example, including many computer scientists. For technical views on this debate see the Eastport Study Group Report (1985); Ornstein et al. (1984); Parnas (1985); B. Smith (1985); and Nelson and Redell (1986).

3. This list is compiled from official DoD Strategic Computing Program documents and Morton (1988, pp. 39-43; quote from p. 41).


5. From Defense Computing magazine promotional material, 1988, citing a 1987 study by the Electronics Industries Association and from Robert J. Bunker, "Digital Battlefield Conference," Military Review, May-June, 1995, pp. 3-4. However, New York Times reporter Jeff Gerth (1989) put annual Pentagon spending on computers, software, and related services at $9 billion. It wasn't clear if either of these figures include computer expenses of the CIA, NSA, NASA, and DEA, of the DOE's weapons manufacturing, of ARPA and other research, of the microchips in weapons, or other hidden expenditures directly in the Black Budget. In any case the amounts spent are huge.


7. A partial listing of universities with researchers accepting SCP contracts in the 1980s shows broad participation: Carnegie-Mellon University, University of Maryland, University of Massachusetts, University of Southern California, Massachusetts Institute of Technology, University of Rochester, University of Pennsylvania, Columbia University, New York University, Ohio State University, Stanford University, Yale University, University of Minnesota, Georgia Institute of Technology, University of California at San Diego, University of Southern California--Information Science Institute, Brown University, University of California at Los Angeles, University of Cincinnati, University of Houston, Northwestern University, City University of New York, Columbia University, University of California at Berkeley, Princeton University, and the California Institute of Technology.

8. An expert system is an AI program that simulates the information and logical
processes of some expert in some limited and carefully defined field. Currently there are civilian expert systems that analyze geologic data to predict if oil might be found, analyze X-rays and other medical data for diagnosis, and repair engines, among many others tasks.

9. Another reason for the failure of the Libyan raid (unless you count killing Gadhafi's 4-year-old daughter as a success) was the low radar “significance” (meaning reflectivity) of Tripoli in general. Despite laser targeting that involved shining laser beams on the targets, and target confirmation through radar and infrared TV pattern matching, only a few of the targets were hit while stray bombs struck the French embassy and many private houses (Editors of Time-Life, 1988, pp. 61–62).

10. The Time-Life book Understanding Computers: The Military Frontier has some excellent illustrations of several of these games, including RSAS (see Editors of Time-Life, 1988).

11. From Meyer (1988, p. 103). Others argue that the Aegis, while “a giant step up the ladder of automation in combat systems” because of its self-testing, automated detecting, and total hands-off capabilities, is still “not an application of expert systems technology” in a full sense (Keen, 1988, p. 98). Just exactly what counts as being AI work is a matter of debate and continual redefinition. The Aegis can be called an artificial intelligence for several reasons. First, it fits most dictionary definitions of AI (Beardon, 1989, p. 12; A. Chandor et al., 1981, p. 38). Second, the military clearly thinks of it as an AI system, and that is a key reason it has had the effect it has. And, third, although the details of its programming are highly classified, it seems to me that any system that coordinates so many complex subsystems, that integrates so much different data, that controls so many deadly weapons, and that has the independent ability to find a target, choose the target, and destroy that target, as the Aegis does, is an AI. For a full discussion of the Aegis system in action see C. H. Gray (1997).

12. When categorical statements are made about what the Aegis noted or didn’t, they are based on the Navy’s replaying of the Vincennes’ Aegis tapes in a mock combat information center at the Aegis Combat System Center at Wallops Island, Virginia. I am assuming in this case that there were no recording errors and that the information was not tampered with, although both are certainly technically possible.

Chapter Four

1. See the work of Marvin Minsky for the frame metaphor and a sophisticated mix of many of the other current favorites in his “society of mind” idea (1985). Schank and Abelson (1977) are the main proponents of scripts. Simon (1980) and Newell (1986), alone and together (1963), have done the most to spread the simplistic “rational man” model.

2. As is his fashion, Latour not only rejects the term postmodernism in this essay but argues that there was never any modern world at all. He labels the current era premodernism or nonmodernism (see especially p. 17).

3. Other efforts at reconceptualizing science from feminist and related perspectives can be found in many different grass-roots groups. Especially numerous are groups that
advocate the revaluation of nature, such as eco-feminists, Greens, anarchists, deep ecologists, and neopagans (Epstein, 1986). For a Marxist-feminist argument for adding "heart" to the "head" and "hand" of modern science see Rose (1983).

Chapter Five

1. Ferrill traces modern war back as far as Alexander the Great, and even argues that Alexander's army could have beaten Wellington at Waterloo. While a bit far-fetched, this contention does make his point that in terms of scale and weapons battle did not change that much, especially in style, in the c. 2,150 years between the battles of Issus (333 B.C.E.) and Waterloo (1815 C.E.). I agree with most historians who argue that the technological changes (in weapons, transportation, and communications), sociological changes (in class structure, bureaucratic infrastructure, and army composition), and philosophical or methodological changes (in leadership, logistics, and the art and science of battle) in war around the sixteenth century mark a new type of war, modern war. What Ferrill's argument rightly emphasizes is that between ancient and modern war there is a great deal of continuity.

Chapter Six

1. Some people would use "modernization" here in place of modernism. I make the term an "ism" in order to emphasize how much the modern point of view is a matter of belief and is not just a given. Modernism is an ideology constructed around the central tropes, rhetorical and ontological, of individualism, science, technology, progress, productivity, art, nationalism, and democracy, among others.

2. The ecological historian Alfred Crosby coined this term to refer to the Americas, Australia, New Zealand, and South Africa, where European people, flora, and fauna have come to dominate the indigenous species (1986).

3. Of course the story is much more complicated than that. As Alfred Crosby shows in his book, Ecological Imperialism: The Biological Expansion of Europe, 900–1900 (1986), disease played a major role in weakening indigenous people. There were other important factors as well. Yet, when all is considered, the decisive element seems to have been the success of modern war.

4. This explains in part why Hall and Wolf downplay the role of technoscience in the developments of war during this period; they neglect the importance of smiths and other craftsmen in the founding of science. Both Edgar Zilsel (1942) and Mircea Eliade (1962) have shown that such groups were a crucial and often neglected part of the creation of modern science.


6. See Catton (1981). He argues that the Civil War was the first modern war. It did mark the decline of cavalry as a first-line military arm, the first ship sunk by a submarine, the first ironclad duel, the use of railroads for logistics, and the extensive use of balloons, rifled and repeating small arms, and other innovations. But is this
enough to make it the first modern war? Modern war seems to have been developing consistently since the end of the feudal era, as is argued in the previous chapter. The Civil War is in complete continuity with the Napoleonic campaigns, where artillery was often decisive, and even further back to the total war waged by the French Republic, reinventor of conscription in modern times.

7. The studies involved testing whisky, preserving paint on knapsacks, the galvanic action of zinc and iron, exploring Yellowstone, and meteorology (Kranzberg, 1969, pp. 125–126).

8. From Ellis (1973, pp. 81–82, quoting V. A. Majendie). Machine guns, only possible because of mass production techniques, were also very important in the suppression of mass labor protests, as Ellis points out.

Chapter Seven


7. The war also played a key role in introducing cybernetic thinking to other disciplines. Conrad H. Waddington, the well-known geneticist, worked for the Royal Air Force Operations Research Section on defense calculations for combating U-boats. After the war he brought cybernetic paradigms into biology (Haraway, 1981–1982). Paul Edwards (1986a) convincingly traces the founding of the field of cognitive psychology to OR on antiaircraft gun control.

8. Just exactly what makes a machine the first computer is debatable and probably not that important. The idea of computing is an old one. The first “computers” so named were, of course, humans who did calculations. Even into the 1940s the large number of engineers and mathematicians, many women, who did calculations on mechanical and electromechanical machines for aeronautic and other companies were called “computers.” The simple electrical and/or mechanical machines that did ballistic and other calculations, often using analog methods, for weapons and weapon platforms were also often called “computers.” In the frenzy of World War II a number of machines were built that performed functions previously accomplished by human computers or those impossible for humans to do. They had various elements of what
we now recognize as computers, and many of them have some claim to being the first
computer of some type or another.
11. National Archives Record Group U-234, Box 8.
12. Merrill Flood, a RAND mathematician, claims to have coined the term
"software" in 1946 to "distinguish costs not directly attributable to military hard-
ware." When General Eisenhower saw the term he found it objectionable (Ceruzzi,
1989a, p. 249).
13. Two years later, RAND and 18 aircraft companies founded SHARE, a user
group for the IBM 704. Led by Paul Armer, head of RAND's Numerical Analysis
Department, it was the first computer user group (Ceruzzi, 1989a, p. 47). RAND also
was interested in artificial intelligence from the beginning. Two AI "fathers," Allen
Newell and Herbert Simon, wrote what might well be the first official military report
on AI, RAND Research memorandum RM-2506, dated December 28, 1959, called
"The Simulation of Human Thought" (p. 240).

Chapter Eight

1. For example, Gen. Hap Arnold in 1946. Many other military leaders have
said that war must now end. See the quotes from Gen. Dwight D. Eisenhower, Gen.
2. Kull, 1988, p. 240. At a conference I attended once, three different high U.S.
officials—an adviser, a general, and an ambassador—said exactly the same thing.
Unfortunately, I promised not to quote them.
3. For an eyewitness impression of the bombing of Hanoi see Salisbury (1967,
pp. 188-198). He cites Hanson Baldwin of *The New York Times* for the number of
U.S. planes lost. For a detailed account of the surface rivalry that warped the bombing
campaign, and for an analysis of why opening up the restricted target areas in North
Vietnam would not have changed the outcome of the war, see Baritz (1985, pp.
246-252). For a sample of the belief that more bombing would have won the war see
Moorer (1987): Adm. Thomas H. Moorer (ret.), who had been the Chairman of the
Joint Chiefs during the latter part of the war, claimed that if the military would have
been given a free hand "we could have polished those clowns off in six months."

Chapter Nine

1. Throughout the JLIC the importance of definitions is stressed again and again.
For example, to begin Chapter 7, "Peacekeeping," there is an extended discussion of
just exactly what peacekeeping is:
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The United States Army defines peacekeeping as military operations conducted in support of diplomatic efforts to achieve, maintain, or restore peace in areas of potential or actual conflict. However, no single definition is accepted by all services and agencies. (p. 7-1)

Then follows much tortuous explaining of the differences between peacekeeping and peacemaking and the admission that while some feel the military is not the appropriate way to try keep the peace, "the United States uses military forces as the primary element in such operations" (p. 7-1).

2. All three epigrams are quoted from Dillon (1988, pp. 15, 23).

Chapter Ten

1. Combat, Hogan's Heroes, and McHale's Navy were TV shows in the 1960s about World War II. The Green Berets was a best selling Robin Moore novel, a hit record, and a John Wayne movie. Deerhunter, Platoon, Apocalypse Now, Coming Home, and Fields of Stone are movies about the Vietnam War. Tour of Duty was a late-1980s TV series about a platoon in Vietnam during 1968–1969. M*A*S*H was a successful book, movie, and TV comedy about a Mobile Army Service Hospital (MASH) during the Korean War. Good Morning Vietnam is a 1980s movie about a wild disc jockey in Vietnam. China Beach was a 1980s and early 1990s dramatic TV series centered around nurses in a hospital in Vietnam, also during the crucial 1968/9 period. On the World War I poets see Paul Fussell's remarkable work The Great War and Modern Memory (1975). The definitive World War II novel is perhaps Joseph Heller's Catch-22, though Norman Mailer's The Naked and the Dead and Kurt Vonnegut's Slaughter House Five are equally extraordinary in their own ways.

2. Information from the National Coalition on Television Violence and by watching TV with my toddler son from 1985 to 1989.


5. Quoted at the head of Chapter 8, "Counterterrorist Commandos: The New Samurai," in Neil Livingstone's The Cult of Counterterrorism. Livingstone (1990) goes on to explain on p. 293, that "Some have called them the 'modern Ninja,' others the 'new Samurai.' They are a special breed of men, living testimony to the difference between mere soldiers and warriors."

Chapter Eleven

1. The following information, and the quotations, are taken from a copy of the U.S. Army's AirLand Battle 2000 plan, dated August 1982. While the doctrine is in
place and being used, as in the Gulf War of 1991, many of the technologies on the DoD wish list are still under development.

2. Those figures are from Gen. Lawrence Skantze's speech "AF Science & Technology—The Legacy of Forecast II," given at Aerospace '87, the AIAA convention, Crystal City, Va., 1987.

3. Epigrams from Military Space Staff, 1988e, p. 1. Some European nations have proposed a unified European military space force, whereas others have called for demilitarizing space. Already there is a high level of European civilian space cooperation and various cooperative military projects such as the Italian, French, and Spanish joint military satellite (milsat) projects. France is especially committed to maintaining its great power status by having a strong military space presence. Israel and China also have milsat programs.

-- Chapter Twelve --

1. To this day the story persists among radical computer scientists that Turing was murdered by British (or American) secret agents, although there is no direct evidence for this. The supposed method of death, a poisoned apple, is evocative though. Andrew Hodges has written a moving biography, Alan Turing: The Enigma (1983), about this brilliant and tragic scientist.

2. My thinking on von Neumann and Wiener, and on much else, has been strongly influenced by Eglash (1989).

3. All quotations by Theodore Taylor here are from public discussions at the University of California at Santa Cruz, April 28 and 29, 1986.

4. The peace army was endorsed by the National Mobilization for Survival and numerous other activist groups in the United States but never really got off the ground.

5. This is based on my 20 years as a participant-observer in various peace organizations and campaigns. It is true that generally the more formalized and bureaucratic an organization gets the fewer women are in it, but this isn't always the case, witness the Nuclear Freeze Campaign. For a moving and extended discussion of the warrior metaphor as it applies to women, see the issue of Woman of Power magazine dedicated to the "Woman as Warrior," 3, Winter/Spring, 1986.

-- Chapter Thirteen --

1. That conventional war will die out and only LiCs continue on infinitely as Van Creveld (1991) argues seems very unlikely. He seems to believe it only because he thinks war is inevitable, but apocalypse (like peace) is unthinkable.