Strategic Studies Institute SSI

CHINA AND THE REVOLUTION IN MILITARY AFFAIRS

Bates Gill
Lonnie Henley

U.S. Army War College

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. AGENCY USE ONLY *(Leave blank)*	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED
	May 20, 1996	Final Report

4. TITLE AND SUBTITLE

China and the Revolution in Military Affairs (U)

5. FUNDING NUMBERS

6. AUTHOR(S)

Bates Gill
Lonnie Lenley

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)

Strategic Studies Institute
US Army War College
Carlisle Barracks, PA 17013-5050

8. PERFORMING ORGANIZATION REPORT NUMBER

ACN 96019

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSORING / MONITORING AGENCY REPORT NUMBER

11. SUPPLEMENTARY NOTES

12a. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution unlimited

12b. DISTRIBUTION CODE

13. ABSTRACT *(Maximum 200 words)*

The author of the first essay, "China and the Revolution in Military Affairs: Assessing Economic and Socio-cultural Factors," argues that, for a variety of reasons, China cannot seize the Revolution in Military Affairs. For example, China is missing a generation of educated men and women due to the excesses of the cultural revolution. The author of the second essay, "China's Capacity for Achieving a Revolution in Military Affairs," argues that China's limited capabilities of air and sea forces will not enable it to achieve the level of military capability demonstrated by the United States during the Gulf War.

14. SUBJECT TERMS

Revolution in Military Affairs; China; United States; Russia; Mao; Confucianism; Tiyong Concept; People's Liberation Army (PLA)

15. NUMBER OF PAGES

62

16. PRICE CODE

17. SECURITY CLASSIFICATION OF REPORT	18. SECURITY CLASSIFICATION OF THIS PAGE	19. SECURITY CLASSIFICATION OF ABSTRACT	20. LIMITATION OF ABSTRACT
Unclassified	Unclassified	Unclassified	UL

CHINA AND THE REVOLUTION IN MILITARY AFFAIRS

Bates Gill
Lonnie Henley

May 20, 1996

****

The views expressed in this report are those of the authors and do not necessarily reflect the official policy or position of the Department of the Army, the Department of Defense, or the U.S. Government. This report is cleared for public release; distribution is unlimited.

****

Comments pertaining to these monographs are invited and should be forwarded to: Director, Strategic Studies Institute, U.S. Army War College, Carlisle Barracks, PA 17013-5050. Comments also may be conveyed directly to the Conference Organizer, Dr. Earl H. Tilford, Jr., by calling commercial (717) 245-4086 or DSN 242-4086. Copies of this report may be obtained from the Publications and Production Office by calling commercial (717) 245-4133, DSN 242-4133, FAX (717) 245-3820, or via the Internet at rummelr@carlisle-emh2.army.mil.

****

These monographs were originally presented at the U.S. Army War College Seventh Annual Strategy Conference held April 23-25, 1996, with the assistance of the Office of Net Assessment. The Strategic Studies Institute is pleased to publish the paper as part of its Conference Series.

****

All 1995 and later Strategic Studies Institute (SSI) monographs are available on the Strategic Studies Institute Homepage for electronic dissemination. SSI's Homepage address is: http://carlisle-www.army.mil/usassi/.

FOREWORD

The Army War College's Strategic Studies Institute held its Seventh Annual Strategy Conference in April 1996. This year's theme was "China into the 21st Century: Strategic Partner and . . . or Peer Competitor." One of the issues of this year's conference was China's ability to participate in the Revolution in Military Affairs (RMA). The two essays that follow address that topic.

Dr. Bates Gill of the Stockholm International Peace Research Institute (SIPRI), on a panel entitled, "Seizing the RMA: China's Prospects," argued that there is more to participating in the RMA than securing or producing high-tech weaponry. A revolution is an all-encompassing phenomenon with socio-cultural as well as purely technological aspects. China's prospects for seizing the RMA lie not so much in the development of technology as in the restructuring of concepts and organizations. History, culture, and philosophical values will make it difficult for China to participate in the RMA.

On the other hand, Dr. Gill believes that China may be able to develop an "RMA with Chinese characteristics" much as it took Marxism-Leninism, a Germanic-Russian innovation devised for proletarian revolution, and modified its tenets to be relevant within a peasant revolutionary context. Through sheer determination and by optimizing technology and expertise available from outside sources, China might approximate a less sophisticated RMA entirely suited to its own needs.

Army Lieutenant Colonel Lonnie Henley joined Dr. Gill on this panel. His paper argues that, over the next 20 years, China will deploy a dozen or so divisions possessing relatively advanced systems, but that overall, the PLA will remain about a generation behind the U.S. Army in terms of its ability to participate in a fully-developed RMA. Furthermore, capabilities within the air and sea forces of the PLA will be even more limited with relatively small infusions of advanced aircraft like the SU-27 and naval vessels such as the KILO class submarines. These modern weapons will make up only a fraction of what will be otherwise dated forces. According to Colonel Henley, by 2010 the PLA may be able to achieve the kind of capabilities demonstrated by U.S. forces in the Gulf War.

These papers paint a picture of China with limited potential to become a peer competitor of the United States in the next two decades. Nonetheless, there is little doubt that China's relative power in Asia and globally will grow sharply in that period. Even partial success in pursuing advanced military technology and organizing concepts could enhance the speed and impact of that rise in power.

The exploration of the issues surrounding the RMA has only just begun, and the essays that follow are worthy of consideration by anyone interested in the role that China may play in the strategic military balance early in the 21st century.

RICHARD H. WITHERSPOON
Colonel, U.S. Army
Director, Strategic Studies Institute

BIOGRAPHICAL SKETCH OF THE AUTHOR

BATES GILL heads the Project on Security and Arms Control in East Asia at the Stockholm International Peace Research Institute (SIPRI). Formerly he held the Fei Yiming Chair in Comparative Politics at the Johns Hopkins University Center for Chinese and American Studies in Nanjing, China. A specialist in East Asian security affairs, Dr. Gill's research and publications focus on China's arms trade, arms production, and arms control activities. His latest book, co-authored with Taeho Kim, is *China's Arms Acquisition from Abroad*, published by Oxford University Press.

LONNIE HENLEY, Lieutenant Colonel, U.S. Army, is a strategic intelligence officer and China foreign area officer assigned to the Office of the Deputy Chief of Staff for Intelligence, Headquarters, Department of the Army. He is a graduate of the United States Military Academy and holds masters' degrees in Chinese language and history from Oxford and Columbia Universities. He has served three tours in Korea and three years as a China analyst at the Defense Intelligence Agency.

CHINA AND THE REVOLUTION IN MILITARY AFFAIRS: ASSESSING ECONOMIC AND SOCIO-CULTURAL FACTORS

Bates Gill

> At present, a technological revolution in high and new technologies is sweeping across the globe, and increasingly becomes a critical factor in measuring a country's national power and military strength. . . . The next ten years are of critical importance for China's vitalization.
>
> Marshal Nie Rongzhen,
> Founding father of PRC's
> military-technical base, 1991[1]

A FRAMEWORK FOR ANALYSIS

This paper is organized into four principal sections. The first section will introduce a framework for analysis by first broadly sketching the meaning of a revolution in military affairs (RMA) and offering general background points about China's relationship to past and current RMAs. The body of the paper consists of two principal sections which focus respectively on economic and socio-cultural factors and which affect China's capacity for change, innovation, and adaptability particularly in areas of activity critical to grasping the current RMA. A concluding section will assess how socio-cultural and economic factors will affect China's progress in grasping the current RMA in particular, and its military effectiveness overall.

Conceptualizing an RMA.

To define and describe an RMA is a complex and esoteric undertaking, one which has consumed the time and intellectual energies of numerous analysts who have in turn produced a burgeoning body of analysis.[2] Rather than

reinventing the wheel on this subject, or developing a hard and fast definition, it will be more useful for our purposes simply to sketch those broad areas of agreement among analysts of past and contemporary RMAs. Indeed, in terms of theory-building and policy prescription, the study of RMAs remains in its nascent stages, barely out of the definitional starting blocks.[3] At this early stage in the development of our understanding of RMAs, offering a general concept of what constitutes an RMA–rather than explicitly linking the definition to the current RMA, or to present and future capabilities and strategies of the U.S. military–seems to be a more sensible approach if we are to usefully develop our conceptual understanding of China and RMAs.

In broadly sketching the areas of apparent consensus on what constitutes an RMA, and drawing from the literature just cited, we can note the following general points:

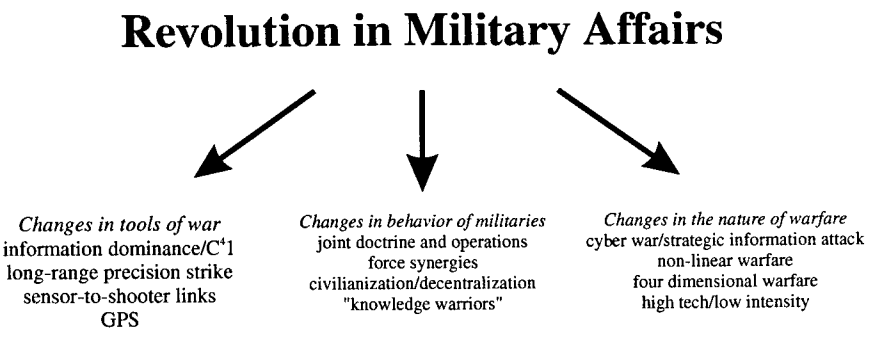
- that RMAs are *not simply technological* in nature, but concern significant progress and change in at least 4-5 important military-related areas: technology, systems, operations, organization, and strategy (see Figure 1 for a rough diagram of how these components appear in the current RMA);

- that changes or progress in these areas in and of themselves do not represent a true RMA, but rather it is the *synergistic combination* of these developments which forms the true RMA and *alters the nature of warfare*;

- that RMAs emerge from *revolutionary changes of historic magnitude within the broader social, economic, and political environments* of national and global societies, which in turn offer the conditions for RMAs to be recognized, appreciated, internalized, and exploited;

- that the smooth and successful process of recognition, appreciation, internalization and exploitation

requires *flexibility, adaptability, innovation, and openness to change.*



Source: Adapted from Jeffrey Cooper, "War in the Information Age: The Changing Technology of the Battlefield," paper presented at the conference on *Rethinking Proliferation in the Post-Cold War Era*, Wilton Park Conference Centre, Sussex, England, December 8-10, 1995; Randall G. Blowdish (Lt. Cmdr., USN), "The Revolution in Military Affairs: The Sixth Generation," *Military Review*, Nov-Dec. 1995; Michael J. Mazarr, *The Revolution in Military Affairs: A Framework for Defense Planning* (Carlisle Barracks, PA: Strategic Studies Institute, U.S. Army War College, June 10, 1994).

Figure 1.
Elements of the current revolution in military affairs (RMA).

China and RMAs.

Based on this broad conceptualization of RMAs, three general points will serve as a background to the subsequent discussion of economic and socio-political factors affecting Chinese approaches to the current RMA.

Playing "catch-up." It was China's fate that at the historical period of its confrontation with the West–in the early to mid-19th century–another critical historical development was taking place to form a watershed in the development of military strategy and technology. On the far side of that watershed, dating back to the earliest days of recorded history, developments in military strategy and technology were marked by their evolutionary and slow character. But since the mid-19th century, change in military strategy and technology was marked by its rapid and revolutionary character. Whereas prior to this watershed, change in military strategy and technology was

measured in centuries, since the mid-19th century revolutionary change in military affairs is measured in decades or less.[4] The revolutionary and rapidly changing nature of military affairs is unlikely to slow in the foreseeable future–and may accelerate in what Alvin and Heidi Toffler have called the "Information Age" or "Third Wave" of warfare.[5] Metz and Kievit hypothesize that in the future a series of "minor revolutions in military affairs will occur closer together than in the past, almost to the point of continuous revolution."[6]

As a result, since the mid-19th century, and throughout its tortuous process of nation-building to the present day, China has been playing "catch-up" with increasingly recurrent revolutions in military affairs. Concomitant with its broader efforts to modernize, a constant theme in the relationship between China and military affairs since the mid-19th century has been its ability or inability to adapt to rapid change and innovative military developments even as the pace of change increases. To use the Tofflers' typology, just as Agrarian Age China struggled to confront the Industrial Age West from the mid-19th century onward, so too today a (mostly) Agrarian Age and (nascent) Industrial Age China now must confront the Third Wave of the Information Age emergent in the Westernized world.[7] This point serves to give some historical background to the problem at hand, allowing us to understand more of the contextual forest so as to better analyze the trees immediately before us.

Avoiding the U.S. yardstick. Our understanding of RMAs is dominated by what it means for the United States, and not for other countries. In particular, the literature tends to focus on defining the current RMA–with its emphasis on high-tech systems such as stand-off precision strike weapons; command, control, communication, computers, and intelligence (C^4I) capabilities; and information dominance–and suggesting policy options ahead, all in relation to the United States. In short, our definitions, frameworks, theories, and policy outputs on the RMA are constructed and debated for the most part with reference to

the forces, threats, and missions of U.S. armed forces. Moreover, because the United States already has highly sophisticated battle-tested weaponry, its armed forces are far ahead on the learning curve, having successfully tackled fundamentals in R&D and production and moving toward refining both the technology and strategy demanded by the rapid changes of the Information Age. Applying this yardstick, the United States clearly dominates in the four key areas of RMAs: technologies, systems, operations, and organization, making it rather easy to conclude that the Chinese do not have a grasp of the RMA, and are far from doing so.

But, for a number of reasons, it would be unwise to blindly apply this yardstick in our strategic analyses of other countries such as China. First, it too easily falls prey to an over-reliance on the technological superiority inherent in the United States' grasp of the current RMA. Blind faith in the "silver bullets" of technology too easily dismisses the possibility that China can compete successfully with the United States and other technologically advanced counterparts at some threshold below or outside the RMA as defined by U.S. forces. Second, from a more analytical point of view, this yardstick avoids answering *why* China has not grasped the current RMA, and *what factors* will determine its ability or inability to do so at some point in the future.

This point emphasizes that we find ourselves treading in new conceptual territory where we are likely to encounter conceptual throughways and roadblocks not found on the RMA map as designed in the United States. As we will see, factors entirely alien to the American experience–such as communism and Confucianism–play a critical role in the likely successes and failures in China's progress toward current and future RMAs.

Comparing successes and failures. In reviewing China's experience with RMAs over the past 150 to 200 years, its clearest success is in the development of nuclear weapons and strategic missiles in a relatively short span of time. In the integration and operationalization of other RMAs,

China has not exhibited such clear success nor rapid development.[8] Arguably, its strategy and tactics in the Korean War were reminiscent of World War I, while its efforts to stage a lightning strike against Vietnam in 1979 quickly bogged down and ended in miserable failure. A discussion of Chinese efforts to more effectively make use of air and naval assets in an integrated fashion is the subject of another paper, but suffice it to say here that China is in the very earliest stages of developing this capability commensurate with capabilities demonstrated by other major powers in World War II.

But the development of nuclear weapons and ballistic missiles appears to be the exception to the trend for China and RMAs, and offers interesting insights into China's ability to grasp the current and future RMAs. First, China mobilized massive intellectual and–at times equally or more important–political resources in an all-out effort to build the bomb and missile delivery systems in such a short period of time. So great was the effort that it managed to meet with success in spite of the disastrous economic and political maelstroms that swirled through China from the late 1950s though the mid-1970s.[9]

But on the other hand, this effort also reveals insights for what China has not accomplished. China is still behind in this particular RMA, especially in terms of the survivability and accuracy of its nuclear force. It continues to struggle with the development of adequately powerful solid-fuel rocket engines, in guidance systems, and in the development of multiple-warhead weapons. While China can claim a nuclear "triad," it always placed its greatest reliance on its land-based force, and its strategic air and submarine forces are of questionable reliability. Of the five declared nuclear powers, China maintains its minimal deterrence posture–though it may be in the midst of some modification[10]–which can only be *roughly* equated in force and capability to that which was deployed by the superpowers more than 35 years ago.

This point is raised to suggest that while China has shown success in pursuing the nuclear weapon/ballistic

missile RMA, that success has thus far been limited to mastering fundamental technologies and deployments, and has not moved far in terms of operational capability and survivability nor doctrinal developments.

ECONOMIC FACTORS

Are economic and socio-cultural factors critical determinants for the RMA, and, if so, how can their impact be analyzed? As for economic influences, the Realist school has long held the importance of economic factors for national power. Realist critiques suggest that economic power, not military power, will be the more critical determinant of national strength. The Tofflers argue that the conduct of warfare is very much a reflection of the economies that fight them, "not in technological terms alone, but in organization, communication, logistics, administration, reward structures, leadership styles and cultural assumptions." Put another way, "smart tools in the economy produce smart weapons for war."[11]

Looking ahead and beyond current economic factors, we should recognize that the Information Age will redefine the critical economic endowments for power. In addition to the traditional three economic factors for national power as understood by Realists–land, population, and resources–a fourth factor, information, will be entered into the mix. How well an economy adapts to this new reality will partially determine its comprehensive national strength, and affect national power in such fundamental areas as trade, business, education, technical skills, propaganda and political control, as well as military capability.

The following analysis will assess three critical economic factors for their impact on China's ability to adapt to and exploit capabilities inherent in the emergent RMA: autarchic development; industrial policy and organization; and commitment of financial resources.[12]

Autarchic Development.

China's traditional economic development policy of "self-reliance" is rooted in historic concerns and has important implications for the country's ability to adapt to change in general, and to see progress toward the current RMA in particular. Like other countries, China's concern for self-reliance is security-related: the more a country can rely on itself for its economic and military needs, the less likely it can be held hostage in times of crisis.

But for China, the concern for self-reliance has deeper roots than basic security concerns. Because of its recent history, particularly what the Chinese term the "century of shame"–from the onset of foreign encroachment onto Chinese territory in the mid-1800s until the Communist consolidation of its victory on the mainland in the mid-1900s–China remains highly sensitive to dependent and semi-dependent relations with foreigners. China's "betrayal" at the hands of Khrushchev and the final collapse of massive Soviet economic and military assistance in 1960 further strengthened a well-entrenched propensity toward self-reliance and autarchy. The concern for over-reliance on and even distrust of foreign economic sources and contacts is reflected recently in Beijing's decision to regulate access to financial data and information provided by foreign news vendors.[13]

In the especially sensitive area of military technology and development, the concern over self-reliance is even greater. China's singular aim in the development of its military technology is to establish the means to produce the weapons and technologies itself. As the official history of the Chinese defense industry puts it:

> In the process of developing its science and technology for national defense, China has always stood firmly on the foundation of self-reliance, correctly handling the relationship between foreign goods and self-development and overcoming an improper underestimation of our capabilities and a tendency toward blind reliance on copying foreign imports. As to introducing foreign assistance and technology: we need to,

> but cannot simply depend on or blindly follow them. Study them, but also know their fundamental nature so to put them to our own use. . . . In this new era and for the future, China will always adhere to the fundamental guideline that the development of defence science and technology must principally rely on its own strength.[14]

Today, as defense R&D and production "goes global," and the costs and complexities of military technology increase, China's military modernization efforts may not be able to so firmly adhere to such traditional principles. Current Sino-Russian cooperation may indicate a growing awareness in China of the need to cooperate more closely with foreign suppliers in the development of its military, but this relationship remains at an early stage.

More broadly, the Tofflers note how countries such as China–which still seek and wilfully exhibit the trappings of self-reliance and nationhood–will resist what they view as the intrusive influences of globalization which characterize the next "wave" of development, the Information Age. Chinese efforts to strictly monitor the Internet is just one of many manifestations of this tendency.[15] This has significant economic ramifications, not only for China's ability to develop its military, but more broadly for its ability to successfully reap the fruits of participation in the global economy. Many analysts suggest that the Soviet Union's inability to integrate with the global economy was a decisive factor in its demise.

Industrial Policy and Organization.

Industrial policy and organizational methods have an important influence on China's ability to absorb technologies, exchange findings and ideas, and adapt to new circumstances in order to more effectively grasp and exploit developments in the current RMA.[16] Moreover, in an apparent paradox, while the economic reforms of the Deng era have done much to strengthen China's comprehensive national strength, they have weakened its defense industrial base in many ways. Of greatest interest to our discussion at this point, three important factors arise: the

Soviet and Maoist legacy; commercialization; and decentralization.

Soviet and Maoist Legacy. China's industrial base, and particularly its defense industrial base, is still dominated by the organizational model adopted from the Soviets in the early 1950s which has traditionally been characterized by over-centralization and bureaucratic formalism.[17] Our discussion will focus on several key aspects of this system. First, the development of industry, and particularly the defense industry, heavily relied on large scale output of what the Chinese call "copy production." This characteristic feature of Chinese defense production derives from the Soviet reluctance to part with production technologies, the exigencies of the Sino-Soviet split which compelled China to learn how to produce its own weapons, and the Maoist proclivity to reward quantitative rather than qualitative production targets. The current exhortations within the defense R&D and production sector to "contract the front, give priority to key projects" and "more research, less production" acknowledge the need to restructure the sector's approach to development.

Second, the Soviet legacy has left a vertically-organized and highly redundant production system, with limited experience in either "rationalization" or downsizing and few horizontal linkages across production sectors or between research and production facilities. This is especially true in the defense production sector, which was traditionally isolated and protected–geographically, organizationally, and politically–from developments and innovations in other sectors of the economy. Under these conditions, the problem of information "scarcity" arises. In China, information and technology remain highly scarce resources, which are tightly guarded mostly by bureaucratic agents and institutions of the state.

This traditional separation of the commercial and military sectors and lack of institutionalized horizontal information-sharing becomes especially problematic in an information-based age when the diffusion of commercial technologies and organizational principles are particularly

important in making progress in the current RMA. China has made significant strides in recent years to "cross-fertilize" between the military and commercial sectors and to decentralize decision-making (see below), but this effort continues to meet with difficulties. An indication of these difficulties is found in the *China Daily* which reported in December 1995 that China's enormous research establishment–2.4 million researchers at 5,860 research institutes, 3,000 university research centers, and 10,000 business-related research units–produces some 30,000 patents a year, of which about 5 percent end up in production.[18] In other words, while considerable research is conducted, little reaches the point of application.

Third, the Soviet system of economic organization has left a system which does not offer strong incentives to broad-based science and technological innovation and achievement. The system is run by bureaucrats and party officials whose interests lie not in the development of scientific knowledge, but in meeting production and political quotas. Moreover, in the formative years of the People's Republic, enormous intellectual and financial resources were poured into the military production sector and especially to applied research for mass production, to the detriment of more comprehensive and theoretical science and technology expertise.

To be sure, the Soviet and Maoist models promoted mass production, and, as noted above, resulted in certain key breakthroughs, such as in ballistic missiles and nuclear weapons. But the price was the development of a stultified defense science and technology sector which became accustomed to reverse-engineering rather than technological innovation and lacked an integrated and rational system of R&D development, production, and procurement. But, this system offered little in the way of "know-why" or "know-how," has not left a tradition of innovation or "cross-fertilization" within and among relevant institutions and individuals, nor led to the firm creation of the critical link between research and production.

Commercialization. Now nearly 15 years into the ambitious Chinese defense conversion effort, the program has a number of success stories, but overall has proved extremely difficult, with most defense enterprises continuing to lose money and facing tough times ahead.[19] Commenting on the looming socio-economic crisis facing the Third Front defense industries in rural Sichuan Province, a Chinese commentator noted that "most of the factories are on the verge of bankruptcy" and concluded that in their turn to the market "prospects for success are dubious."[20] With 55 per cent of China's defense industries in Third Front areas, the conversion effort is both necessary and problematic.[21]

The move into commercial activities diverts resources and expertise out of military production. Official statistics note that on average 70 per cent of the output value of Chinese defense enterprises under the State Council is for the civilian market and the aim is to raise this figure to 80 per cent by 1999; some sectors already claim a much higher conversion rate. According to some Western estimates, about 90 per cent of Chinese defense production capacity sits idle.[22] But these figures appear to hide actual conditions on the ground, where the vast majority of defense production enterprises have great difficulty in converting to commercially viable production.[23] Furthermore, it appears that the commercialization effort invests financial and intellectual resources in areas geographically and conceptually outside the traditional centers of arms production with the creation of "window enterprises" and PLA companies in the prosperous coastal regions of China which are not engaged in military R&D and production activities.[24]

On the other hand, the trend towards commercialization may prove advantageous for the industry as a result of "spin-on" synergies. The Chinese have begun to recognize that the foundation for military technologies of the future will increasingly be commercial technologies. The Vice-Minister of the Commission on Science, Technology, and Industry for National Defense (COSTIND), Huai Guomo, stated in 1993:

> Because national defense high technology is by its nature having multiple technologies, the differences between defense and civilian technology is becoming smaller and smaller. The trend of interchangeability between the military and civilian is on the rise, allowing the technical foundation for an accelerated modernization of national defense and to realize the steady improvement of weapons.[25]

General Liu Huaqing, China's highest-ranking active military officer and Vice-Chairman of the Central Military Commission, said in early 1995 that China "should pay attention to turning advanced technology for civilian use into technology for military use."[26] Official Chinese policy appears to view conversion and the commercialization of the industry in an optimistic light, but moving from concept to realization will be no easy task with little past experience upon which to found the effort. But it will be critical for China to develop this capability in order to grasp the current and future RMAs.

Decentralization. Overall economic trends in China today are towards placing greater decisionmaking authority in the hands of provincial, municipal and enterprise authorities, a trend which is also taking place in the defense R&D and production sectors.[27] However, tensions and contradictions exist between the center and subordinate units as these developments unfold. As a result, the picture on economic decentralization and its effect on China's approach to the RMA is not clear. On the one hand, and over the short term, the decentralization trends will pose difficulties to the defense-related R&D and production units. On the other hand, decentralization in principle can help China over a longer term to develop the concepts, organizational structures, and conditions needed within its economy to exploit the emergent RMA.

As part of the economic reform and modernization effort since 1979, the main government units responsible for weapons development and production have been periodically reorganized in an effort to streamline and rationalize the system. Since 1979, the defense industries under the State Council have undergone at least three

major reorganizations, and we now may be seeing the advent of a fourth reorganization. First, in the early 1980s, the formerly numbered machine-building industries were given names and were streamlined somewhat, with the Eighth Machine Building Industry (missiles) merged into the Seventh to make the Ministry of Space Industry, and with the shipbuilding industry set up as a ministry-level corporation. In 1988, these ministries were regrouped under three ministry-level organizations–the Ministry of Energy Resources (MER) (including nuclear industry), the Ministry of Machine Building and Electronics Industry (MMBEI) (included electronics, ordnance and land systems), and the Ministry of Aerospace Industry (MAS) (including aircraft and aviation products, missiles, and space launch vehicles and satellites).

Most recently, over the period 1991 to 1993, the MER, MMBEI, and MAS were shut down, and their subordinate industries were reorganized under five ministerial level corporations ostensibly subordinate to the State Council: China State Shipbuilding Corporation (CSSC), China Aerospace Corporation (CASC), China National Nuclear Industry Corporation (CNNC), China North Industries (NORINCO), and Aviation Industries of China (AVIC). The Ministry of Electronics Industry was set up as a regular ministry, though parts of the industry were commercialized in the form of China Electronic Industry Corporation (also know as Chinatron). The trend toward decentralization is further confirmed by the November 1995 Chinese White Paper on arms control which notes "the government departments formerly in charge of military production have already been changed into general corporations [and] will step by step develop into economic entities engaging in research, production, and business."[28]

This gives a freer hand to hundreds of factories, companies and research institutes which are ostensibly subordinate to the ministry-level corporations. However, in the near term, coordinating development and production of defense materiel–hardly ever a well-coordinated effort in the Chinese experience[29]–will only become more difficult

under the market conditions currently prevailing in China which favor the realization of quick profits in the commercial sector over long-term planning. In one example, managers at NORINCO apparently tried without success to drastically cut back on the company's centrally-mandated defense production quotas in order to free up resources for more lucrative commercial production ventures. In discussions with managers of defense production units in late 1995, it was clear that many would like to get out of the defense production business completely.

The picture is further muddied by the official line for the defense science and technology enterprises. The official policy, harkening back to the achievements of 35-40 years ago, offers "strengthened centralized and unified leadership as the fundamental assurance for defense science and technology development" as the number one lesson of China's defense science and technology experience.[30] Maintaining the spirit or the letter of such a policy will probably not be conducive to the kind of open and innovative environment called for by the emergent RMA. This political and economic tug-of-war–reminiscent of previous critical development debates in contemporary Chinese history–is likely to continue for some years to come to the detriment of coordinated efforts aimed at getting a technological and organizational handle on the emergent RMA.

Commitment of Financial Resources.

China has limited financial means to devote to science and technology development over all, and defense-related R&D and production in particular. Indeed, "science and technology" and "defense" remain third and fourth priorities, respectively, in the Dengist canon of the "Four Modernizations." However, as the Chinese economy continues to thrive, new developments and synergies in the commercial sector could overcome traditional state-based sources of support to the science and technology and defense R&D and production communities. But for China to make significant advances in the emergent RMA will require not only improved financial resources to relevant sectors, but

also–more difficult to accomplish–considerable improvement in the development of human resources.

The four tables in this section present basic trends and indicators for certain potential financial resources to support science and technology development and defense R&D and production in China. Table 1 presents the most recent statistics available from the United States Arms Control and Disarmament Agency (ACDA) on Chinese military expenditure. The ACDA figures are "rough estimates," and are some 7-8 times higher than the official Chinese defense budget figures.[31] In any event, working with Chinese sources, Wang finds that the official Chinese defense budget "does not cover the costs of research and development on new weapons and equipment," the funding for which comes out of other budgets.[32] But the ACDA figures indicate that Chinese military spending has

Year	Annual Spending	% of GNP	% of CGE
1983	53,050	6.8	30.4
1984	52,140	5.8	26.1
1985	52,160	5.1	23.8
1986	50,960	4.6	19.3
1987	51,400	4.2	19.5
1988	52,040	3.8	20.0
1989	51,320	3.6	19.1
1990	54,110	3.7	18.8
1991	52,000	3.3	17.3
1992	54,870	3.0	16.9
1993	56,170	2.7	16.2

Figures are in constant (1993) million U.S. dollars, and as a share of gross national product (GNP) and central government expenditure (CGE).

Source: U.S. Arms Control and Disarmament Agency, *World Military Expenditures and Arms Transfers, 1993-1994*, Washington, DC: U.S. Government Printing Office, February 1995, p. 58. The source notes that these are "rough estimates."

Table 1.

Chinese Military Expenditure, 1983-93

remained relatively steady over time, when factored for inflation and the devaluation of the yuan, between approximately 50 and 55 billion U.S. dollars a year. Unfortunately, these figures do not break down the totals into spending categories such as R&D. Recent estimates for Chinese spending on defense- and weapon-related R&D are in the range of U.S.$1 billion to U.S.$5 billion a year.[33] One researcher, reaching the lower figure, also placed it in perspective to other countries' military R&D spending in the period 1992-94 (Table 2).

Country	Year	Government Expenditure on Military R&D
Canada	1993	210
China	**1994**	**1,000**
France	1992	4,700
Germany	1992	1,600
India	1994/95	320
Italy	1993	530
Japan	1992	660
Russia	1994	1,000
Spain	1993	290
Sweden	1992	450
United Kingdom	1993	3,900
United States	1994	42,000

Figures are in million U.S. dollars.

Notes: Calendar years except for India, for shich the fiscal lyear is given; because of budget and conversion uncertainties China and Russia figures are accurate to one significant digit. Others are accurate to two significant digits. Source: Eric Arnett, "Military Technology: the Case of China," *SIPRI Yearbook 1995*, Oxford: Oxford University Press, 1995, p. 376.

Table 2.

Estimated Government Expenditure on Military R&D in China and Democratic Countries Which Spent Over $200 milliion U.S. Per Year, 1992-94.

It is similarly difficult to get good figures on the amount China spends on science and technology R&D overall. According to one recent source, China spent approximately

1 per cent of GNP, or about U.S.$4.0 to 4.5 billion in 1992.[34] The United Nations estimates that in 1992, China expended approximately 16.9 billion Chinese yuan, approximately 0.5 per cent of GNP, on R&D expenditures (slightly less than U.S.$3.0 billion at 1992 exchange rates).[35] In 1992, one researcher states the China Natural Science Foundation (CNSF) was providing a total of 80,000 researchers with approximately 2.26 billion Chinese yuan.[36] However, this appears to be an exaggeration, as official statistics state that the CNSF was to receive only 1.5 billion Chinese yuan for the entire Eighth Five-Year Plan, 1991-1995, or an average of 300 million Chinese yuan per year. The amount of funding from the CNSF was to reach 500 million Chinese yuan per year for 1995.[37] Table 3 offers some comparative figures for national R&D spending as a percentage of gross national product for several countries. As another point of comparison, the Pentagon recently reported that its requested 1997 budget for R&D and procurement of "information technology," particularly in communications and electronics, amounts to nearly U.S.$3 billion.[38]

Another potential revenue source for Chinese defense-related R&D and production development is derived from the sale of weapons, both as exports and as domestic procurement. However, this source of investment has come under pressure in recent years as exports and domestic procurement have both declined precipitously. Table 4 indicates that when measured in SIPRI trend indicator values, the volume of Chinese arms exports has dropped rapidly in recent years and particularly since the late 1980s. Similarly, domestic procurement has decreased as well, in some cases quite considerably.[39] Even as some defense procurement continues, the financial resources available to the plants remains relatively limited as a means to reinvest in improved facilities and R&D. A leading Chinese defense economist writes that the current pricing system for Chinese defense products continues to limit profits for the manufacturer to around 5 per cent of the cost of production, according to the formula of "planned cost x (1+ 5 per cent)".[40] It is unclear how much of this profit is reinvested in R&D or plant development. A high-ranking

Country	Year	R&D Expenditure as Percentage of GNP
Canada	1992	1.6
China	**1992**	**0.5**
India	1990	0.8
Japan	1991	3.0
South Korea	1992	2.1
Soviet Union	1988	1.8
Sweden	1991	2.9
Taiwan	1993	1.9
United Kingdom	1992	2.1
United States	1988	2.9

Sources: United Nations, UNESCO Statistical Yearbook 1995, Lanham: Bernan Press, 1995, Table 5.1; Statistical Yearbook of the Republic of China, Taipei: Directorate General of Budget Accounting, and Statistics, 1995, Table 56.

Table 3.

R&D Expenditure as a Percentage of Gross National Product (GNP) for Selected Economies in the Years Indicated (1988-93)

official in CAPUMIT states that profits from military enterprises is reinvested according to the "5 + 3 + 2" formula: 50 per cent is reinvested in upgrading the plant; 30 per cent is devoted to plant and facilities maintenance; 20 per cent is used for personnel and administrative costs.[41] This underlines that 50 percent is reinvested in upgrading the plant; 30 per cent is devoted to plant and facilities maintenance; and 20 per cent is used for personnel and administrative costs.[41] This underlines the point that production and R&D tend to be separated, not only spatially and conceptually, but with regard to resource-access as well.

Taken together, the potential sources of financial commitment to the development of China's science, technology and R&D strengths seems comparatively weak, at least in relation to the types of technological and conceptual breakthroughs which seem necessary for China to see progress with the current RMA. While there is a clear understanding on the part of the Chinese leadership of the

necessity to devote more resources to R&D, to integrate more fully with the international economy, and to radically restructure its research and production communities, this process will be slow and painful.

SOCIO-CULTURAL FACTORS

Socio-cultural factors and their influence on military prowess and strategic thinking are less obvious and have not been treated as amply in the literature as have the more obvious and measurable economic factors. The notion of "national character," "national morale," and the "quality of society and government" and their influence on national power were treated by Morgenthau in his 1948 classic, *Politics Among Nations*.[42] In efforts to discern Soviet military thinking, studies on Moscow's "strategic culture" appeared in the 1970s,[43] and have since been supplemented more recently by similar studies addressing other cultures.[44] One study in particular has sought to refine this approach, arguing that "the nature of a society can affect the military power generated by the society," suggesting that our analyses should focus on "the dominant social structures of a country" and how they influence "the amount of offensive and defensive national military power that can be generated from a given quantity of material resources."[45]

With regard to the RMA in particular, much scholarship and the popular imagination have tended to stress the technological factor as a driver of military change. But in the context of the current debate on the RMA, the most careful observers emphasize the multi-dimensional character of the RMA, and stress how it is couched within a broader set of determinants. Cooper argues that:

> creating a revolution is more . . . than pushing the frontiers of science or the boundaries of military systems; it must be a positivist process that requires adaptation by the organism (or organization) for exploitation to occur.[46]

Another analyst of the RMA notes the importance of behavioral factors such as "new operational concepts, new tactics, and new organizational structures," all of which

derive from "the current confluence of social, political, economic, and technological forces."[47]

It is to this socio-cultural realm that we now turn to analyze how established Chinese norms and values affect the country's approach to RMAs. In particular, the following pages will consider historical and contemporary Chinese socio-cultural foundations and their impact–for better and for worse–on China's ability to recognize, appreciate, adapt to, and exploit revolutionary changes in military affairs.

Historical Context.

Confucianism. Confucianism is at its root a set of socio-cultural norms which value and legitimize conservatism in thought, and the maintenance of the status quo in political, socio-economic, and cultural structures. Originally conceived as a means to ensure the stability and prosperity of Chinese agrarian society, Confucianism seeks precisely to avoid revolutionary and disruptive change. As Lucien Pye argues:

> The Confucian ideal was eminently appropriate for an agrarian society but was detrimental to the development of commerce and industry. Eventually, the Confucian tradition . . . worked against the Chinese in their confrontation with the modern industrial and technologically oriented West.[48]

RMAs by their nature are "antithetical to existing cultural norms and bureaucratic structures."[49] It will be difficult enough within a society and military which values technology and is relatively accustomed to innovation and change–such as the United States–to come to grips with the demands of the new era in military affairs. For China, a society which is–by tradition and by exigencies of contemporary socio-politcial realities–conservative and resistant to foreign ideas, adapting to new concepts and organizational structures will be difficult and problematic.

Specifically, we can point to four key aspects of Confucianism as important in relation to RMAs. First, the pervasive influence of Confucianism is still felt today in its

segmentation of society, both horizontally and vertically. Confucian norms look favorably on and promote a society so regulated because it is understood that the system is stable and conducive to prosperity and moral betterment when "everything is in its proper place." From top to bottom, in rank order, society was divided into the following: the emperor, the mandarin class of scholar-bureaucrats, farmers, and artisans, with merchants and soldiers occupying the bottom rungs. Cutting down vertically across those horizontal divisions were other lines of division: geographic, demographic (urban vs. rural) and familial. This structure tended to restrict movement of ideas and labor, while conserving the socio-cultural structure intact with little change. In principle, the tenets of Confucianism allowed that those with merit–as determined by the level of scholarly ability to master the Chinese canon–were able to cross over these societal divisions. In practice, only those with the time and means to devote to the years of training and study necessary to succeed in the examination system could hope to enjoy much mobility.

Second, Confucianism teaches the centrality of government not only as a dominant but (ideally) enlightened ruling force, but also as purveyor of unifying socio-cultural values. It also served for the ruling class as a "common code" of conduct and moral virtue. In the wrong hands, however, this ideal could be easily corrupted to a simple facade for perpetuating authoritarianism and tyrannical political, social, and cultural policies.

Third, Confucianism diminishes the role of the individual in favor of the collective good. Confucians expect individuals to perform certain duties and functions in accordance with their determined place within society. In doing so, the individual is assured to have done his part in contributing to the stability of the entire society. Individualism, or acting outside one's "role," was not considered socially acceptable behavior, and contravened the interests of the whole.

Fourth, the Confucian system valued education to the degree it accomplished two principal purposes. First,

education was intended to be the formal vehicle through which was conveyed a narrow set of immutable and predetermined norms, values and precepts. The process of scholarship entailed committing these subjects to memory with little question or investigation. Problems which subsequently arose were to be solved with strict reference to the canon. Second, education was intended to broadly prepare the scholar to assume functionally unspecialized duties within the government. As a result, matters of study outside of the canon–natural sciences, technology–were beyond the socially acceptable pale or were scorned for their overly specialized and impractical nature. Under this system the inventiveness and innovation which marked early Chinese history bogged down from the Ming dynasty onward into the 20th century–a span of nearly 500 years.

The Tiyong Concept. The *tiyong* concept is another historically important influence on Chinese socio-cultural norms. It provides a transcendent normative basis for Chinese approaches to socio-economic and technological development and its relations with the outside world in general. The *tiyong* concept–short for *zhongxue weiti, xixue weiyong* (Chinese learning for substance, Western learning for practical use)–speaks to a belief in the inherent superiority of things Chinese. This is the view which understands China as an inherently higher culture and civilization, reluctant to accept and integrate the ideas and learning of foreigners, particularly those of the West. Moreover, as the notions of "science" and "technology" became increasingly associated with the West, so too they were treated with less respect within the *tiyong* framework. Time and time again in Chinese history since the 1500s, the introduction of Western learning and concepts–sometimes introduced peacefully, other times rudely crashing onto Chinese shores–were rejected with reference to arguments conceptually related to the *tiyong* ideal.[50]

One example of this tendency is particularly illuminating for our understanding of socio-cultural influences affecting the exploitation of RMAs in China. Following its devastating defeat at the hands of Japan in

the 1895 (in which China was forced to cede Taiwan, the Pescadores and the Liaodong peninsula to Japan), China subsequently launched the ill-fated "Hundred Days of Reform." With little planning or strategic vision, reform-minded advisors to the Qing court attempted to drive through rapid changes to the Chinese economic and scientific system similar to what they perceived to be the accomplishments set in motion in the late 1860s by the Meiji Revolution in Japan. The reformers issued proclamations mandating the establishment of new academies of learning, the development of railroads, the adoption of Western scientific methods, and the translation of Western texts. This movement was quashed almost as quickly as it began by the Empress Dowager and her court of conservative supporters. The reformers were hounded out of office, some were killed, and the violently xenophobic Boxer Uprising erupted shortly thereafter in 1900.

These concepts underpinning Chinese socio-cultural norms are not simply historical oddities, but continue to shape the way modern-day Chinese leaders and citizens view their world. On the one hand, this outlook helps to unify a disparate nation of more than a billion persons, and provide some sense of Chinese identity. The sense of "being Chinese" is a powerful emotional and motivational force to Chinese on the mainland and around the world. On the other hand, remnants of the Confucian socio-cultural system, strengthened in ways by communist rule, stifle innovation, promote rigidity in thinking, and tend to favor paralysis over adaptability, all of which are not conducive to recognizing, accepting, and exploiting the emergent RMA.

Contemporary Context.

Communist authoritarianism. Communism and Confucianism share many socio-cultural similarities, but communist rule added new dimensions of its own. In particular, through wielding modern means of communication, propaganda, and political control, the communist leadership has largely strengthened many of the

stultifying practices of Confucianism (while often condemning the belief system in theory). On the other hand, the communist leaders in their early years of rule were able to concentrate the levers of power available to them in a way which resulted in significant military-technical breakthroughs particularly with regard to establishing a rudimentary but functional conventional and nuclear deterrent.

The communist leadership is duly proud of its accomplishments in restoring a semblance of order and stability to China upon its victory in 1949, following the long "century of shame" characterized by chaos, war, civil strife, and the often-vicious intrusions of foreign powers. The communist system quickly sought to impose its set of rules upon the Chinese society to govern behavior, reward the good and punish the evil. The system included its own understood hierarchy where–as in Confucianism–the leaders were above the law but (ideally) benign and with the society's greater interests in mind. Beneath the leaders, the widening ranks of party members–properly imbued with the communist canon–took control of the bureaucratic levers of power, while beneath them China's vast numbers of peasants were considered with special favor as were soldiers who fought for the revolution. At the bottom of the ladder, merchants, entrepreneurs, and landlords were eventually dispossessed of their capital and relegated to second-class citizenship. Also near the bottom of this hierarchy were persons with foreign connections and learning, who were particularly suspect in the new system. Geographic, demographic, and familial divisions remained important, but the communists added a new dimension with the introduction of huge bureaucratic socio-economic organizations such as mass organizations, collectives and communes, and the *danwei,* or work unit. The upwardly or horizontally mobile knew the value of party membership–or at least a strict adherence to the party's teachings–to their ambitions.

As in Confucian practice, the centrality of the ruling group–embodied under communism in the form of the

Party–is unquestioned. Moreover, through the massive socio-economic organizations to which all belong, the party is able to socialize the citizenry, unify thinking, and convey acceptable socio-cultural norms and behaviors. The role of the individual is subsumed to the will of the society–as defined by the party orthodoxy. Moral models such as Lei Feng–a self-proclaimed simple but devoted cog in the giant social machine–are extolled. Individualism and unorthodox thinking are shunned and often punished severely.

With Maoist disdain and suspicion of intellectuals, learning is less revered than under Confucianism. "Merit" and moral conduct (i.e., learning and practicing the communist canon) is more often preferred to technical expertise. Experts and specialists in science and technical fields, while often talented, are shabbily and at times brutally treated, and considered suspect in difficult political times. The Cultural Revolution destroyed a generation of possibilities in terms of human capital. It may seem strange that the official line of the defense science and technology sector is compelled to exhort its people to "respect the knowledge and talent" of the intellectuals and experts in their ranks, but such calls are apparently still necessary.[51] To this day, the arguments pitting "red" versus "expert," the "open door" versus the "Four Cardinal Principles," and attacking the deleterious effects of (foreign) "bourgeois liberalism" and "cultural pollution" provide a thin contemporary veneer over the deep-seated nature of these debates.

These proclivities of the communist society reveal themselves in the troubled way in which defense-related R&D and production are conducted in China. These problems have been often cited by Western and Chinese observers alike.[52] In reviewing the relevant Chinese and Western literature, and in discussions with official researchers and experts concerned with the development of China's defense R&D and production base, problems related to the communist system consistently emerge: the persistence of "leftist" and "ideological" thinking which has prevented the establishment of a more rational and

scientific approach to decision-making; bureaucratic formalism and over-centralization; poor coordination across the life cycle of a weapon system; profligate and misdirected spending; an institutionalized lack of horizontality between the defense R&D and production sectors and to the outside commercial sector; and a continuing lack of esteem and incentives for scientific expertise. In addition, the nature of the Chinese socio-economic system requires a considerable amount of political will to be directed from the top down before change and innovation reform can be implemented from the bottom up.

Attempts to break down this system and to introduce reform and management techniques aimed at improving the defense industrial base have had only mixed success, limited almost entirely to the commercial sector. In the words of one Chinese defense industry expert, a change for the better in the system will require "efforts by a generation of people."[53]

Post-Mao modernization. In the two decades since Mao's death, Chinese society and values have undergone tremendous change. While deeply-rooted forms of social organization and values under Confucian and Communist systems continue to be predominant, the reforms and societal transformation of China over the past 15 years–which can be expected to continue and even accelerate in the years ahead–create change and tensions that are both beneficial and detrimental to China's ability to adapt to exploit the changes inherent in the emergent RMA. It is still too early to know with certainty where these changes will lead, if they can be sustained in a positive way, or if China will stay true to its history and continue its rocky and problematic relationship with change and foreign concepts.

At this early stage, however, it may be useful to consider how post-Mao modernization has affected the social position and status of Chinese human capital, which, perhaps more than any other single factor, will determine China's ability to grasp the emergent and future RMAs. As noted, the past record of Chinese human capital development is mixed, and

since 1949 and the advent of the communist system has included long periods in which scholarly and scientific training and intelligence were actively scorned, and scientists and intellectuals actively punished and even killed. In recent years, China has taken steps to invigorate and heighten the social status of scientific and R&D communities, which, if sustained, will no doubt contribute to improvements in the development of RMA-related systems and organizational constructs. As noted in relation to other aspects of the economy elsewhere in this monograph, the present shake-out in the economy as a result of reform will probably have short-term deleterious effects on the development of China's human capital, but may pay off over a longer term.

In the short term, the socio-cultural mantra defining the rapid Deng-era changes could be summarized in the words of the paramount leader himself: "It is good to be rich." This has resulted in an increase in corruption, an entrepreneurial preference for quick profits over long-term visions, an even more covetous protection of information and technology by bureaucrats-cum-businessmen, and, of interest to our discussion, a slow drain of expertise out of scholarly and research fields, and into business. For the defense R&D and production sector, this trend poses some difficult challenges. For example, the president of Aviation Industries of China (AVIC) said in 1993 that in the face of lucrative opportunities in the commercial sector, he has problems keeping his staff of 10,000 engineers, technicians, and designers "energized and committed to aerospace."[54] Frieman argues that the "open door policy has also made a career in non-defense related science more attractive than it might have been in earlier periods," adding that the "military sector might still have some of the best, but it no longer has all of the best, of China's scientists."[55] The apparent employment of some Russian scientists also suggests that China has difficulties meeting its defense production R&D goals strictly through reliance on its own expertise. Indeed, the official history of the Chinese defense industry makes the case for improved technical training and education, allowing that China "lacks personnel" who can

"carry forward the frontier of today's national defense science and technology sector."[56]

Thus, while the modernization and reform effort will carry forward and meet with a number of significant gains, it may do so by taking socio-cultural directions not immediately beneficial to long-term national health. This period of socio-cultural change will be characterized by social disruption and decentralization, restructuring of societal organization, the introduction of new cultural norms and behaviors, the development of new conceptions of "good" and "bad," "right" and "wrong," and the creation of a novel approach to solve pressing problems. This process will take time, will be resisted by entrenched interests, and in the near term will slow China's efforts to fully exploit the emergent RMA.

CONCLUSIONS

Profound Changes, but to What Result?

A first conclusion we should draw from this brief analysis is to acknowledge that profound changes are occurring in Chinese economic and socio-cultural spheres which have important implications for the country's approach to emergent RMAs. But while this may be obvious, a more nuanced understanding of the process requires analysts to recognize that while many of these developments are conducive to China's approach to the RMA, others are not.

For China's approach to RMAs, indeed to change generally, it will no doubt benefit from those economic and socio-cultural developments which favor greater flexibility, adaptability, and innovation. Such changes underway in China are often remarkable in their extent and pace. To take just one example, the official Chinese press recently noted that about half of the enterprises in a "pilot project"–607 out of 1,290–succeeded in "transforming their corporate management from a planned-economy type to one for a market economy." The enterprises established supervisory boards and business-oriented meetings, abolishing their

former reliance on bureaucrats and party organization.[57] But the fact that the effort is in a pilot stage, involves a small number of enterprises (of which only half were thus far successful), and that such events should be news at all are illustrative of the deeper obstacles that must be overcome in spite of impressive gains thus far.

As to the RMA itself, it would seem that the PLA and defense R&D community has begun the process of recognition and debate beyond its immediate shock at the display of high-tech warfare against Iraq in 1991. On October 26, 1995, the China Defense Science Technology Information Center (CDSTIC), the information clearing-house and think-tank connected to the ministry-level commission in charge of China's defense industries (Commission for Science, Technology and Industry for National Defense (COSTIND)) held a seminar on the topic of "miliary technical revolution." Bringing together persons from the Academy of Military Sciences, the National Defense University, the armed forces, and defense-related industries, the seminar addressed "the intention, characteristics and development" of the military technical revolution, and the "need to renew concepts and bring about overall development in PLA military theory research."[58] In addition, efforts are underway to open up the defense R&D and production system to outside influences, especially in the context of increasingly friendly military-technical relations between China and Russia.[59]

These changes and opportunities are impressive and hold great potential. On the other hand, in the grand scheme of things, in these changes we are witnessing a China still struggling–sometimes successfully, other times not–with the economic and socio-cultural implications of the shift from agrarian to industrial society. This struggle has been marked by widespread social and political upheaval, tortured cultural introspection, and economic turbulence that the current and relative stability of Chinese society appears to belie. But another great wave of change is likely to come to China, even as it continues to grapple with its transition to the industrial age. China's confrontation with

this next wave is just beginning, and the ultimate social, political, economic and military impact of the information age for China is yet to come.

Technology-led or Behavior-led RMA?

As suggested by Figure 1, the component parts of the emergent RMA can be divided into three categories. The first category concerns the "tools of war" with an emphasis on technology as their defining feature. The second category concerns "behavior" and focuses on changes in organization and ways of thinking as critical drivers. In studying China and the RMA, this distinction is important. In particular, the work presented here suggests that the greatest obstacles between China and the emergent RMA does not rest in the development of technology so much as in the restructuring of concepts and organizations. It will be in this critical area–where the attributes of innovation, integration, flexibility, adaptability are all-important–where China is likely to have the most difficulty.

Three important points support this view. First, the commercial nature and current diffusion of militarily-relevant technology is such that it is probably only a matter of time until China possesses and begins to see advances with critical technologies for warfare in the information age. In the post-industrial age, the accoutrements of power are not as dependent on classic factor endowments such as land, labor, and capital, and are more related to information. This source of strength is more transferable, meaning the diffusion of power *as technology* is greater. For example, China is working on the development of stand-off precision strike cruise missiles, on the development of a GPS system, and on improving C^4I capability. But the critical test for China will not be simple possession of the technology (it is said tongue-in-cheek that China can put together at least *one* of almost anything), but rather applying to it the conceptual and analytical tools necessary to understand the technology and operate it effectively in the new conflict environment.

Second, China has met with relative success in those RMAs which were primarily driven by *technological* breakthroughs. In cases where the driver was a compelling need to address a strategic problem (an operational and organizational driver) or to respond to fundamental economic, political, and socio-cultural changes, China has not fared as well.[60] This point may be all the more relevant in this period of rapid decentralization in China. It seems difficult to conceive how China, under the economic, social and political conditions prevailing today, can ever again mount the kind of massive, highly-centralized, technology-driven undertaking which accomplished its breakthrough to nuclear weapons and ballistic missile technologies.

Third, in the past it was often the case that technology led doctrine. But, on the other hand, in today's technology- and information-rich environment, potential applications are developing rapidly, and the opportunities for exploitation are growing exponentially. Future success in grasping the revolution in military affairs may well require the creation of well-considered frameworks and doctrinal approaches first, and *then* choosing and integrating available technological choices to fit the requirements. In other words, with a wide and seemingly unlimited range of technological choice in front of strategists and planners, it will be wise to carefully devise strategy and doctrine best-suited to the future, before investing scarce financial and intellectual resources pell-mell in areas that ultimately are not suited to long-term national defense.

China, like others countries, is not experienced in this approach, which demands a considerable degree of flexibility and innovation. But unlike other countries, this problem seems particularly acute in China. Many examples and analyses illustrate the problem. Richard Latham, describing Chinese military R&D and production policy, writes that "little thought was previously given to linking threat and strategy to equipment manufacture."[61] John Lewis and Xue Litai, in their study of China's nuclear missile submarine project, reveal that "China's current

strategic doctrines are the product, not the cause, of the projects' political-technical evolution. . . . The strategic doctrines did not shape the projects nor provide a coherent context for them."[62] A researcher at the China Defense Science and Technology Information Center writes that "in our weapons system acquisition process there are the following cases: though a weapons system has already entered into the engineering development state, its operational mode has not yet been determined."[63] The Chinese have gone forward with a major aircraft development program (the K-8 jet trainer), even to the point of having produced a number of operational models, but now have a small purchase committment from Pakistan, and no orders forthcoming from the PLA.[64] A Chinese researcher who has spent much of his career studying the procurement process in China sums up the problem when he writes of the "segmentation phenomenon":

> R&D evolves along the phases of basic research, applied research, development, production and deployment.... Should a problem arise in a certain link in the process ... productivity will be affected. Therefore it is very important that they should be organically coordinated. In this respect, China still has many problems.[65]

China's highest ranking active military officer and leading advocate of military modernization, Liu Huaqing, has weighed in on this subject as well: "[I]mprove coordination. When a new project is launched, in the very beginning, we must consider from an overall angle the related technological support, auxiliary facilities, training of personnel, and other problems. . . ."[66]

Thus, for the future, China will need to focus on the development of restructured conceptual approaches to problems, while also making advances in the development of technology itself. Referring to Figure 1, China will need to make the linkage between "changes in tools" to "changes in behavior." That step is difficult for any organization, and, as we have seen, will be particulary difficult for China.

An RMA with Chinese Characteristics?

While China faces many obstacles to realizing the emergent RMA, analysts should keep two caveats in mind.[67] First, we know that China has shown in the past its ability to focus resources in a way which achieves RMA breakthroughs, as in the development of ballistic missiles and nuclear weapons. This kind of gargantuan and unified effort is idealized in current defense science and technology sloganeering:

> Together, the vast numbers of defense science technology workers and all the Chinese people, under the leadership of the Chinese Communist Party, and adhering to the Four Cardinal Principles and to reform and openness . . . will march on to realize strategic targets and more magnificent and brilliant triumphs.[68]

It is possible that the concentrated effort of China's greatest resource, its people, could result once again in significant advances within the current RMA. This may be more difficult than in previous efforts, but with the availability of technology and expertise increasingly available from outside sources, China could succeed in developing and deploying an "RMA with Chinese characteristics": perhaps less sophisticated, but sufficient for Chinese needs.

This brings up the second point. For the near- to mid-term future it is likely that the kinds of conflicts China might face will not require large-scale exploitation of emergent RMA technologies and concepts. Rather, these conflict scenarios are likely to be limited in time and space, and involve relatively few military assets against foes who are also not well-advanced within the current RMA. For China, a basic deterrent capability, with an ability to exercise its military influence in ways it deems conducive to its interests–incrementally larger presence in the Spratlys, bluster and saber-rattling against Taiwan–may be sufficient in the near- to medium-term to "buy time" as China continues to modernize its armed forces. As the events of early 1996 starkly illustrated, even China's

"junkyard army" can create difficulties and draw the United States into areas of high tension and potential conflict. The Chinese effort to master "high-tech warfare with Chinese characteristics" may be slow but its potential threat cannot be entirely dismissed.

Concluding Words.

Is China within reach of the emergent RMA? In a few words, not in the next 5-10 years. Clearly China is in a period of profound change in the several areas discussed here. It would appear that the Chinese have entered into a very early stage of addressing the emergent RMA–somewhere between the existence of necessary conditions for revolution to occur and a recognition that a revolution is in the making.[69] A constellation of factors–including developments in the economic and socio-cultural realm–will determine where China goes from here.

ENDNOTES

1. Xie Guang, *et al.*, eds. *Dangdai Zhongguo de Guofang Keji Shiye* [*Scientific and Technological Undertakings of National Defense in Contemporary China*], Vol. 1, Beijing: Dangdai Zhongguo Chubanshe, 1992, p. 5 (author's translation).

2. Four of the more recent presentations on the subject are Jeffrey Cooper, "War in the Information Age: The Changing Technology of the Battlefield," paper presented at the conference on *Rethinking Proliferation in the Post-Cold War Era*, Wilton Park Conference Centre, Sussex, England, December 8-10, 1995; Randall G. Bowdish, "The Revolution in Military Affairs: The Sixth Generation," *Military Review*, November-December 1995; Earl H. Tilford Jr., *The Revolution in Military Affairs: Prospects and Cautions*, Carlisle Barracks: Strategic Studies Institute, U.S. Army War College, June 23, 1995; Stephen Metz and James Kievit, *Strategy and the Revolution in Military Affairs*, Carlisle Barracks: Strategic Studies Institute, U.S. Army War College, June 27, 1995. The latter work by Metz and Kievit provides an excellent summary overview of the open literature on the subject, and usefully links theory to prescriptive policy choices.

In addition, extensive treatments of the topic include Michael J. Mazarr, Jeffrey Shaffer, and Benjamin Ederington, *The Military Technical Revolution: A Structural Framework*, Washington, DC:

Technical Revolution: A Structural Framework, Washington, DC: Center for Strategic and International Studies, March 1993; Alvin Toffler and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century*, London: Little, Brown and Company, 1994; Andrew F. Krepenevich, "Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest*, Fall 1994. In April 1994, the Strategic Studies Institute of the U.S. Army War College held its Fifth Annual Conference on Strategy to address the topic of the RMA which produced several valuable studies: Jeffrey R. Cooper, *Another View of the Revolution in Military Affairs,* Carlisle Barracks: Strategic Studies Institute, U.S. Army War College, June 23, 1994; Michael J. Mazarr, *The Revolution in Military Affairs: A Framework for Defense Planning*, Carlisle Barracks: Strategic Studies Institute, U.S. Army War College, June 10, 1994; Paul Bracken and Raoul Henri Alcala, *Whither the RMA: Two Perspectives on Tomorrow's Army*, Carlisle Barracks: Strategic Studies Institute, U.S. Army War College, July 22, 1994. These citations offer only a small representative portion of the writing on the subject.

3. After analyzing the vast literature on RMAs produced by persons in the Department of Defense, the academic strategic studies community, and defense-related think-tanks and consulting firms, two military analysts concluded that while "this group includes some brilliant thinkers, its output so far has not been theoretically comprehensive and, as a result, has offered only limited policy choices." Metz and Kievit, p. 2.

4. The themes of pre-Industrial Revolution military-technical continuity versus the more recent alacrity of military-technical change are expanded in Barry Buzan, *An Introduction to Strategic Studies: Military Technology and International Relations*, London: Macmillan Press, 1987, pp. 18-19.

5. Toffler and Toffler.

6. Metz and Kievit, p. 10.

7. Toffler and Toffler, pp. 18-25, 213-20.

8. Analysts differ over the precise number and type of RMAs that have occurred since the beginning of the 19th century. A representative list might include the following, in chronological order: Napoleonic mass mobilization of conscript armies to achieve theater-wide campaigns; advent of telegraph and trains (as used in the American Civil War and the Franco-Prussian War); mass production and mechanization of materiel (as used in World War I); development of efficient internal combustion engines, advancement in aircraft, and radio communications (as combined to execute blitzkrieg warfare); joint development of nuclear weapons and long-range ballistic missiles;

development of information-based technologies to allow for long-range precision strikes and force synergies through radically improved C^4I capability.

9. The seminal studies on China's efforts to overcome enormous obstacles to develop its strategic forces are John Lewis and Xue Litai, *China Builds the Bomb,* Stanford: Stanford University Press, 1988; John Lewis and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age*, Stanford: Stanford University Press, 1994.

10. See Alastair Iain Johnston, "China's New 'Old Thinking': The Concept of Limited Deterrence," *International Security*, Winter 1995/96, which argues that China may be moving toward a more flexible warfighting doctrine of limited nuclear deterrence.

11. Toffler and Toffler, pp. 37 and 72; see generally their chaps. 2, 3 and 9.

12. See "China's Capacity for Achieving a Revolution in Military Affairs," which follows, for China's technological prospects.

13. "State Council directive to control flow of information in China sparks international criticism," *China News Digest-Global*, January 22, 1996; Steven Mufson, "Beijing Imposes Strict Controls on Economic News," *International Herald Tribune*, January 17, 1996, p. 1.

14. Xie Guang, *et al.*, eds. *Dangdai Zhongguo de Guofang Keji Shiye* [*Scientific and Technological Undertakings of National Defense in Contemporary China*], Vol. 2, pp. 492-93 (author's translation).

15. "Mainland China Internet users ordered to register with police in 30 days," *China News Digest-Global*, February 15, 1996; "Mainland surfers must promise not to 'harm China'," *China News Digest-Global*, February 19, 1996; Seth Faison, "For Internet fans in Shanghai, the real line is wired to the Party," *International Herald Tribune*, February 6, 1996, p. 4.

16. On the effect of economic reform on Chinese defense industries, see Bates Gill, "The Impact of Economic Reform on Chinese Defense Industries," in Mark Weisenbloom, *et al.*, eds., *Chinese Military Modernization,* London: Kegan-Paul, forthcoming in 1996.

17. On the continuing resemblance of China's defense industrial base to that of the Soviet Union, see Erik Baark, "China's policy response to the challenge of new technology," C. Brundenius and B. Goransson, eds., *New Technologies and Global Restructuring: The Third World at the Crossroads*, London: Taylor Graham, 1993.

18. *China Daily*, December 23, 1995, cited in *China News Digest-Global*, January 5, 1996.

19. The most comprehensive analysis of Chinese defense conversion is Jorn Brommelhorster and John Frankenstein, eds., *Mixed Motives, Uncertain Outcomes: Defense Conversion in China,* Boulder: Lynne Reinner, forthcoming 1996. Another excellent study is Mel Gurtov, "Swords into Market Shares: China's Conversion of Military Industry to Civilian Production," *China Quarterly*, June 1993.

20. Pei Jiansheng, "Market solution eludes remote military-industrial complex," *China Daily Business Weekly*, November 6–12, 1994, p. 7.

21. This figure was provided in communication with Jin Zhude, President of the China Association for the Peaceful Use of Military Industrial Technology (CAPUMIT, a research and public relations organization attached to the Commission on Science, Technology and Industry for National Defense), November 1995.

22. "Making a modern industry," *Jane's Defence Weekly*, February 19, 1994, p. 28.

23. Based upon discussions the author held with Chinese and foreign defense industry and military officials, Chongqing, China, November 1995; see also Bates Gill, "Defensive Industry: China's arms makers struggle with the marketplace," *Far Eastern Economic Review*, November 30, 1995, p. 62.

24. See Jin Zhude, "Share-holding system: a new attempt at conversion from military to civilian industry in China" and Lu Yishan and Jiu Jichuan, "Strategic thinking on strengthening international cooperation and promoting conversion from military to civilian industry," in Haiyan Qian, ed., *Restructuring the Military Industry: Conversion for the Development of the Civilian Economy*, Beijing: Publishing House of the Electronic Industry, 1993, pp. 96, 236-41; Tai Ming Cheung, "Serve the people," *Far Eastern Economic Review*, October 14, 1993, p. 64.

25. Xiang Wang, "Xiandai junshi keji fazhan yu junzhuanmin: guofang kegong wei Huai Guomo fuzhuren fangtanlu" ["Development of modern defense technology and defense conversion: Interview with Huai Guomo, Vice-Minister of the Commission of Science, Technology and Industry for National Defense"] *Xiandai Junshi* [*Conmilit*], no. 196, May 1993, p. 4 (author's translation).

26. *Liberation Army Daily*, January 15, 1995, translated in "Liu Huaqing urges development of defense technology," *Foreign Broadcast Information Service, Daily Report: China,* January 30, 1995, p. 30.

27. This point and the following section are based in part on discussions and interviews with Chinese and Western defense and defense industry officials in China in November 1994, January 1995, March 1995, and November 1995.

28. Information Office of the State Council of the People's Republic of China, *China: Arms Control and Disarmament*, Beijing: Information Office of the State Council, November 1995, pp. 14–15.

29. Yan Xuetong, "China," in Ravinder Pal Singh, ed., *Arms Procurement Decision Making*, Oxford: Oxford University Press, forthcoming in 1996. This SIPRI study synthesizes written contributions on Chinese arms procurement decision making from 12 Chinese defense industrial and defense research officials.

30. Xie Guang, Vol. 2, p. 488 (author's translation).

31. The actual figure for Chinese defense spending is widely open to debate, and is probably not known with certainty to the Chinese authorities themselves. Several in-depth studies are available on the subject which discuss the methodological difficulties involved and offer estimates on actual military spending by China. Among the best are: Wang Shouguang, *Demystify China's Defense Expenditure*, unpublished manuscript, May 9, 1995; section on China by David Shambaugh in "World military expenditures," *SIPRI Yearbook 1994*, Oxford: Oxford University Press, 1994, pp. 441-48; Arthur S. Ding, "China's Defence Finance: Content, Process and Administration," *China Quarterly*, June 1996. The ACDA figures represent a "middle ground" among analysts, presumably are constructed in part from information not openly available to the public, and are offered in a time series with constant figures, which most analysts do not offer.

32. Wang, pp. 9-10.

33. Eric Arnett, "Military technology: the case of China," *SIPRI Yearbook 1995,* Oxford University Press: Oxford, 1995, 375-76; Shambaugh, p. 446; Wang, pp. 12-13.

34. Ronald D. Humble, "Science, technology and China's defence industrial base," *Jane's Intelligence Review*, January 1992, p. 4.

35. United Nations, *UNESCO Statistical Yearbook 1995,* Lanham: Bernan Press, 1995, Tables 5.1 and 5.6.

36. Hu Jian, "The role of the China National Science Foundation," in Qian, p. 217. There is some confusion whether the English name of the fund uses "Natural" or "National" in its title. Official sources use the term "Natural."

37. Cui Lili, "Invigorating China through science and education," *Beijing Review*, July 17-23, 1995, pp. 14-15.

38. Pat Cooper, "Information technology spending holds steady," *Defense News*, March 11-17, 1996, p. 22. This amount is broken down as follows: Milstar follow-on program, U.S.$700 million; Joint Strategic Target Attack Radar System (JSTARS), U.S.$700 million; Army digitization program, U.S.$400 million; space-based infrared system US$300 million; cooperative engagement capability, U.S.$300 million; airborne warning and control system (AWACS) aircraft, U.S.$300 million; global broadcast system, U.S.$200 million.

39. John Frankenstein and Bates Gill, "Current and Future Challenges Facing Chinese Defence Industries," *China Quarterly*, June 1996.

40. Ku Guisheng, "National Defense Budgeting Procedure and Price Reforms of Military Products," unpublished manuscript, December 1994, p. 15.

41. Personal communication with the author, November 1995.

42. Hans J. Morgenthau, *Politics Among Nations*, 4th ed., New York: Albert Knopf, 1966, pp. 122-35.

43. Jack Snyder, *The Soviet Strategic Culture: Implications for Nuclear Options,* Santa Monica: Rand, 1977.

44. See Elizabeth Kier, "Culture and Military Doctrine: France Between the Wars," *International Security*, Spring 1995; Alastair I. Johnston, *An Inquiry into Strategic Culture: Chinese Strategic Thought, The Parabellum Paradigm and Grand Strategic Choice in Ming China*, Ph.D. dissertation, University of Michigan, 1993. See also, Alastair I. Johnston, "Thinking About Strategic Culture," *International Security*, Spring 1995.

45. Quotations drawn from Stephen Peter Rosen, "Military Effectiveness: Why Society Matters," *International Security*, Spring 1995, p. 6.

46. Cooper, p. 21.

47. Tilford, p. 2.

48. Lucien Pye, *China: An Introduction*, 4th ed., New York: Harper Collins, 1991, p. 34.

49. Cooper, p. 1.

50. On this point see the historical background offered by Yuan-li Wu and Robert B. Sheeks, *The Organization and Support of Scientific Research and Development in Mainland China,* New York: Praeger Publishers, 1970, pp. 11-40.

51. Xie Guang, Vol. 2, p. 495.

52. Richard J. Latham, "China's defense industrial policy: looking toward the year 2000," in Richard H. Yang, ed., *SCPS PLA Yearbook 1988/89*, Kaohsiung: Sun Yat-sen Center for Policy Studies, 1989, pp. 79-89; Yan Xuetong.

53. Interview, Beijing, March 1995.

54. Michael Mecham, "With many suitors, China seeks 'equal partnership'", *Aviation Week & Space Technology*, October 25, 1993, p. 23.

55. Wendy Frieman, "China's defence industries," *Pacific Review*, Vol. 6, no. 1, 1993, p. 60.

56. Xie Guang, Vol. 2, p. 497.

57. *China News Digest-Global,* March 8, 1996.

58. *Liberation Army Daily*, October 29, 1995, cited in *PLA Activities Report*, Hong Kong: U.S. Consulate General, October 1995, pp. 26-27.

59. The content and impact of Chinese arms and technology imports are documented and analyzed in Bates Gill and Taeho Kim, *China's Arms Acquisitions from Abroad: A Search for "Superb and Secret Weapons,"* Oxford: Oxford University Press, 1995.

60. Cooper, p. 20-22, develops the idea of different forces–technological, operational, strategic–are the primary drivers of RMAs.

61. Latham, p. 86.

62. Lewis and Xue, *China's Strategic Seapower*, p. 20.

63. Qian Xuesen, "Military Systems Engineering," China Defense Science and Technology Information Center Paper no. 2, Beijing, 1989.

64. "K-8 ready for service but lacks PLA budget," *Aviation Week & Space Technology*, February 12, 1996, p. 27.

65. Chai Benliang, "Retrospect and Prospect of Defence R&D in China," unpublished manuscript, November 1994, p. 6.

66. *Jiefang Ribao*, August 6, 1993, cited in "Liu Huaqing Writes on Military Modernization," *Foreign Broadcast Information Service, Daily Report: China*, August 18, 1995, p. 21.

67. These points drawn from Richard Bitzinger and Bates Gill, *Gearing Up for High-Tech Warfare?: Chinese and Taiwanese Defense Modernization and Implications for Military Confrontation Across the Taiwan Strait, 1995-2005,* Washington DC: Center for Strategic and Budgetary Assessments, January 1996, pp. 29-30.

68. Xie Guang, Vol. 2, pp. 503-04. Interestingly, Liu Huaqing, China's highest-ranking military officer and vice-chairman of the Central Military Commission is more realistic: "Without advanced science and technology and people armed with advanced science and technology, modernization is empty talk." Quoted in British Broadcasting Corporation, *Summary of World Broadcasts: Far East*, November 11, 1992, p. B2/4.

69. Cooper, p. 23. Cooper notes five steps in a revolutionary process: (1) existence of necessary conditions; (2) recognition of these conditions; (3) acceptance, adoption and adaptation; (4) debate and specification on the new opportunities and problems to be addressed and created; "institutionalization" of the revolution; and (5) exploitation of the revolution. *Id.*, pp. 23-24.

CHINA'S CAPACITY FOR ACHIEVING A REVOLUTION IN MILITARY AFFAIRS

Lonnie Henley

As China looks ahead to the next century, there is remarkable agreement among its leaders and citizenry on the basic interpretation of modern Chinese history–namely, that China was for millennia one of the wealthiest and most powerful nations on Earth, and that since the early 19th century it has been denied its rightful place among the great powers through the concerted effort of imperialist nations. There is equally widespread agreement on the long-term objective of China's security policy: to become the economic, diplomatic, and military equal of the world's leading powers, meaning the United States. Chinese leaders and analysts estimate that this will take 40 or 50 years. There is also general agreement that the key to achieving this goal is economic development, and that it is achievable on the desired time line only if China is permitted to continue placing highest priority on the economy rather than on accelerated military spending.

In the past year, the perception has also solidified among many Chinese leaders that the United States will try to obstruct China's rise to its rightful place in the world. The United States is the main beneficiary of the status quo, they argue, and China the main challenger to the status quo. In a rather zero-sum view of international relations, they conclude it is almost inevitable that the United States will seek to contain China, undermine its economic development, and prevent its becoming a threat to America's privileged position as the world's only superpower. Eventual conflict with the United States is therefore seen as possible, but not likely for at least 20 years, and ideally not until China has reached full superpower status in the middle of the 21st century. Whether there will

be such a conflict is for another generation to determine; this generation's mission is to put China firmly on the road to recovering its rightful status among the world's leading powers.

Thus, as others will no doubt argue in more detail during this conference, China fully intends to build a military capability equal to that of the United States, but only after it has achieved a level of economic development sufficient to underpin its superpower ambitions. In the meanwhile, the military must improve its ability to defend China in the event of an unforeseen conflict, to enforce China's territorial claims in the South China Sea, and to carry out the forcible reunification of Taiwan with the mainland if called upon to do so. Although these are short-term goals in the grand scheme of Chinese strategic objectives, they will still require considerable improvement over a period of a decade or more. Once the People's Liberation Army (PLA) achieves these objectives, in the second or third decade of the next century, it will turn its attention to the broader goal of matching the full range of American military capabilities, particularly its advanced weaponry and long-range power projection capabilities.

Components of a Revolution in Military Affairs.

The question before this panel is whether, in the course of trying to develop a world-class military, China could achieve the kind of unforeseen breakthrough in warfighting capabilities that we have come to call a "revolution in military affairs," or RMA. As a starting premise, we will take the following definition: an RMA consists of the innovative application of military technology to achieve new military capabilities not achievable by the standard methods in use in other nations. "Revolution" in this case consists of being the first to develop and implement a new paradigm, a new concept of how to prosecute military operations. It does not necessarily require cutting edge technology; in an oft-cited example, the German *blitzkrieg* in the late 1930s employed the same technological components available to the other major powers, but applied according to a radically more

effective operational doctrine. Without denigrating the technological sophistication of the German equipment, it was the doctrine, the innovative application of available technology, that constituted a revolutionary breakthrough. One could even argue that guerrilla warfare as developed by Mao, Guevara, and Ho in the mid-20th century represented an RMA based on a very low level of technology.

More closely examined, the Chinese case involves two different sub-questions. First, can China duplicate the revolutionary advance that American forces made in the 1980s, and then follow us into what we believe will be an equally revolutionary information-based force structure of the 21st century? In other words, can they close what is currently nearly a two-generation gap in fielded military technology, operational doctrine, logistical capabilities, and information processing, and catch up while American forces move as rapidly as they can into the information age? Second, and more importantly, is it possible that China could achieve a revolutionary breakthrough in military capabilities in some other direction, different from what the United States has achieved or is seeking to achieve?

It is debatable whether absorbing and implementing another nation's conceptual breakthroughs constitutes a revolutionary advance. If China follows us through the 1980s development of AirLand Battle, precision deep strike, all-weather and 24-hour mobile warfare, and then follows us into the 21st century "digital battlefield" that we envision, does that constitute a revolution in military affairs on China's part? The argument against is that, eventually, many nations will be able to duplicate the American success, as the technology and concepts are disseminated and implemented throughout the world. On the other hand, this is what many people are thinking when they ask whether China can achieve an RMA, meaning can they achieve the same RMA we are pursuing as we implement information technology throughout our forces. Logically it would seem that this would not constitute an RMA, but since the issue continues to arise, we will examine both sub-questions outlined above.

Consequently, the place to start our discussion is with the relevant aspects of China's current military modernization efforts, both technological and doctrinal.

China's Efforts to Acquire Advanced Technology.

The possible counter-example of guerrilla warfare notwithstanding, it would seem that achieving the kind of breakthrough connoted by "RMA" requires at least fairly advanced equipment for the era in question. Chinese industry has made considerable effort to develop systems more advanced than the early-1970s technology equipment that predominates in the PLA inventory, but Beijing has not placed high priority on fielding the improved systems in large numbers. In part this represents priorities established by Deng Xiaoping in 1975 and reiterated after his return to power in 1978. In a scathing speech to the Central Military Commission in 1979, Deng asserted that weaknesses in education, training, organization, doctrine, tactics, and management procedures meant that the PLA could not effectively maintain or employ advanced hardware even if the nation could afford to supply it. The implicit corollary was that once the PLA overcame these defects, probably in the mid-to-late 1980s, more modern equipment would be forthcoming. The hardware payoff got further delayed, however, by the changes in the international environment, notably *glasnost* and then the fall of the Soviet Union, making it unlikely in Beijing's judgement that China will face any serious threat to national security well into the 21st century. Thus, ever since the early 1980s, the PLA has been focused on the organizational, doctrinal, and human aspects of military modernization, waiting in the meanwhile for Chinese defense industries to catch up with their Western counterparts and begin producing advanced systems at a price China can afford.

Over the past 3 years, this pattern has changed slightly. Beijing has shown an increased willingness to purchase some advanced weaponry, in numbers sufficient for operational deployment, from foreign suppliers. The most visible example is the contract to purchase several hundred

Su-27 fighters from Russia over the next 15 years. This is the only purchase to date that amounts to refitting a significant part of the force with new systems. Other purchases, such as a few SA-10 SAMs and four KILO submarines, serve to fill key weaknesses but leave the bulk of the force with its older Chinese-built systems. In addition to foreign purchases, the PLA continues to receive a modest flow of new and relatively modern systems from Chinese manufacturers, including short-range ballistic missiles, Luda destroyers, Jianghu frigates, and improved models of the F-7 and F-8 fighters.

There are several reasons Beijing has loosened the purse strings. To begin with, there is the persistent inability of Chinese industry to catch up with Western or Russian state-of-the-art. There has been success in some areas, such as solid-fuel missiles and aviation metallurgy, but there remain intractable weaknesses in key subsystems and in overall design. The aviation industry in particular seems unlikely to overcome its deficiencies in power plant, avionics, and system integration any time soon. Regional developments, particularly the purchase of advanced Western fighters by Southeast Asian countries and Taiwan, require increased though limited power projection capabilities sooner rather than later in order to protect Chinese territorial claims. The sudden availability of Russian systems at a reasonable price is also a factor. The biggest reason for Beijing's willingness to spend hard currency on new systems, however, is that the PLA has reached the stage where it needs the advanced systems in order to continue its own development of doctrine, tactics, techniques, and procedures for large-scale joint-service operations.

Doctrinal Development.

It seems clear that Beijing does not intend to refit the entire PLA with modern weapons and equipment. The majority of the PLA's 100-plus ground force divisions will remain low- to medium-tech forces dedicated to internal security, perimeter defense of China's border, and various

forms of economic activity. A much smaller number, perhaps 12 to 18 divisions, are striving to become modernized, mobile forces ready to fight what Chinese planners call "modern local war under high tech conditions." The explicit model for such warfare is the performance of the Coalition forces in Operation Desert Storm. These elite divisions have been engaged for the past several years in what the U.S. Army would call warfighting experiments, developing the doctrine, tactics, and operating procedures for multi-division, joint-service operations on a battlefield characterized by long-range precision weapons, night vision devices, advanced reconnaissance, surveillance, targeting and intelligence systems, and high mobility and firepower. Over the next 5-10 years, the PLA will disseminate and implement the operational concepts developed in the past 3 years. As an aside, the recent multi-division exercise near the Taiwan Strait is much better understood as part of the long-term effort to improve PLA operational capabilities, than as a short-term response to political developments in Taiwan.

Limiting the procurement of more modern weapons and equipment to this subset of Chinese ground forces greatly reduces the cost of modernization. Similarly, the Su-27s and the improved F-7 and F-8 fighters will only make up a fraction of the entire PLA Air Force inventory, and four KILOs only a fraction of the diesel submarine fleet. Even so, the subset of the PLA receiving more modern equipment constitutes a sizeable force, 12 or more divisions and significant supporting elements. Keep in mind, however, Chinese divisions are smaller than their American counterparts, and have considerably fewer supporting assets at the corps and theater army level. The bottom line is that over the next 20 years, China will have a reasonable number of units possessing relatively advanced systems, but will remain about a generation behind the state-of-the-art in the most advanced militaries.

The PLA's energetic efforts to develop and implement a more effective operational doctrine are centered around understanding, applying, and countering the warfighting

concepts demonstrated in the Gulf War. There is extensive discussion in military journals about various aspects of high-technology warfare, both as practiced by unnamed "advanced" militaries (whose characteristics and capabilities are uniquely American), and as could be applied in the defense of China against such an adversary. Chinese press coverage of PLA exercises over the past several years shows that some units are trying to work out how China would fight a high-tech enemy invading China in the near future–for instance, how Chinese forces should counter an enemy with much better night vision capabilities–while others are developing tactics and concepts that will be applicable in the longer run as the PLA receives better equipment. Some exercises, such as the Taiwan Strait exercise this spring, envision offensive operations against Taiwan or the Spratlys, but the majority posture the Red (friendly) Forces in a defensive role against Blue Force invaders.

China's Capacity to Duplicate America's 1980s-1990s RMA.

The PLA's current preoccupation, as we have seen, is to understand and duplicate the American advances of the last 15 years. Our first question is, can they do it, and, if so, how long might it take? And, of course, does it constitute an RMA if they succeed?

There are a great many weaknesses the PLA must overcome before it can carry out the kind of operations the United States did in the desert. Most obviously, the Chinese logistical system is incapable of projecting and sustaining a large force at a great distance outside China's border. This is not a capability the Chinese presently desire, however, so let us recast the logistical requirement to encompass rapid movement and sustainment of large forces within China to counter a highly-mobile adversary. The PLA recognizes that it has major weaknesses even in relation to this limited requirement–severe shortage of heavy airlift, inadequate rail transport, lack of standardization across different military regions, excessive reliance on fixed supply depots,

shortage of organic transportation to move supplies as a unit advances, and much more. There is extensive discussion as to how to modernize the logistical system, but the most that can be said at this point is that the PLA is asking the right questions. Developing the right answers, then retraining the entire force on more modern logistical procedures, is a major task. It is likely to be a decade or longer before there is significant improvement in the PLA's ability to rapidly deploy and sustain forces to fight in a demanding high-mobility, high-firepower conflict.

Learning to conduct large multiservice operations is an area where the PLA is making more progress, but there is still a long way to go. In the past few years, we have seen a number of multi-division exercises, and press reports have lauded commanders for collocating air and ground force headquarters in the same command post to improve inter-service coordination. Observers generally do not consider these to be true joint operations in American terms, however. While the air force may operate in proximity to ground units, and air strikes be synchronized with ground maneuvers, there seems to be little direct interaction between the two. Certainly there is nothing like U.S.-style close air support or air liaison officers with the maneuver brigades, much less anything like Joint Air Attack Teams. U.S. Army commanders are often frustrated that they must request air support many hours in advance, rather than having it instantly responsive to changing requirements, but it appears their Chinese counterparts have no input to air force targeting below the Military Region headquarters level. Nonetheless, the PLA is making significant progress in the planning and execution of large joint operations. It remains an open question how long it will take to reach the level of competence U.S. forces demonstrated in the early 1990s.

There has been some effort to increase the realism of field training, mainly through opposed-force exercise formats where a Blue (enemy) Force contingent offers resistance as the Red Force drives to its objective. Many of these still sound like choreographed set-piece exercises, where the

Blue Force offers only token resistance, and actual Blue Force victories are rare; but some units seem to be taking the concept more seriously, injecting a greater note of realism into field training. The PLA still has a great way to go in this respect, however. The U.S. Army's approach to this problem was to create several training centers where units face a highly-trained opposing force (OPFOR) in a free-play exercise environment. Laser simulators, video and audio recording, impartial umpires, and elaborate instrumentation create a realistic combat environment and provide extensive feedback to the exercising unit. Central to the National Training Center experience is the freedom to fail, in fact the freedom to be thoroughly trounced by the OPFOR if the commander, staff, and unit are not well prepared. Another tool of training realism is computerized battlefield simulation for units which cannot get to the training centers, and a mobile training team that puts division- and corps-level staffs through realistic command post exercises. The training centers, simulators, and training programs took the U.S. Army over a decade to develop and implement. It will take the PLA at least as long, and that only after they embrace the concept of realism in training and the freedom to fail that entails.

The PLA is also addressing some of the more technology-oriented aspects of 1990s-style high-tech warfare. It is investing in modern command-and-control communications systems, short-range ballistic missiles for the operational deep strike mission, improved air defenses, and night vision systems. Chinese publications also discuss the need for electronic warfare and intelligence, reconnaissance and surveillance systems, but it is not clear whether they have developed or begun fielding such systems. There has been virtually no discussion of intelligence processing and fusion systems such as the U.S. All-Source Analysis System (ASAS), or of dedicated communications links for intelligence dissemination. A central feature of current U.S. doctrine is the effort to give the tactical commander the clearest picture of the battlefield possible, down to the brigade and even battalion level. This requires high-capacity, robust communications links,

standardization of data formats and transmission protocols, interoperability of intelligence communications among different systems and services, powerful information processing systems at the lowest command levels, and a commitment to the free flow of intelligence information to tactical commanders. Obviously, we know less about Chinese tactical intelligence than about many other subjects; nonetheless, available sources do not indicate any effort by the Chinese to implement such an elaborate and open intelligence environment.

So the overall prognosis is that the PLA may achieve the kind of capabilities demonstrated by U.S. forces in the Gulf War, though it is likely to take at least 10 and probably 20 years for it to do so. Clearly, this is the task the PLA has set for itself, as evidenced by the nature of its field exercises and the content of military journal articles for the past 4 years. If the PLA achieves its goal, does that constitute a revolution in military affairs? It depends on one's definitions, but I maintain it would not. Many nations are trying to implement the new approaches pioneered by the United States; following in the wake of a successful revolution is not a revolutionary act.

China's Capacity to Achieve an Information-Based RMA.

It is widely perceived in U.S. military circles that if there is another revolution in military affairs in the next few decades, it is likely to be based on the exploitation of information technology. For our purposes, the question is whether, if China caught up with U.S. 1990s-level capabilities faster than anticipated, they could move with us or even ahead of us into the age of the digital battlefield. This seems extremely unlikely.

China lags far behind the Western world, and especially the United States, in its use of information technology. Chinese computer scientists are very competent, and have shown in the past that they can assemble systems in a laboratory environment that come close to the prevailing

state of the art. Their copy of the Cray supercomputer in the mid-1980s is an example. Mass production of high-technology information systems is another matter entirely; while China is making headway in the medium-tech consumer electronics field, no one goes to China for mass production of advanced integrated circuits. The Chinese lag even further behind in circuit design, system integration, networking, operating systems, and development of software applications. Worst of all, from the Chinese perspective, the United States is not only far ahead in these fields; it is also advancing much more rapidly than anyone else in the world. And the greatest creativity is taking place in the development of innovative uses of the available technology. From the Internet to ASAS to on-line banking to powerful database search tools, American society and the American armed forces are moving rapidly along a path that China is not prepared to follow.

It is not just a matter of available technology, or even of creativity in the application of technology. The greatest impediment to China achieving an information-based revolution is its authoritarian political system. The dilemma that has confounded Chinese leaders for over a century, since the Self-Strengthening Movement of the 1880s, is the desire to generate a dynamic, technologically creative society without allowing a permissive political and social environment, to arouse and harness the energies of the Chinese people without giving up governmental control. In America at least, it seems that the creativity and initiative that fuel the information revolution can only flourish in a permissive, free-market environment. China will, of course, obtain and apply information technology developed elsewhere, to include some significant capability to manufacture and modify systems for its own use. As long as the free flow of information is perceived as a threat to the political order, however, China is likely to lag far behind in the application of information technology.

China's Capacity to Achieve Some Other RMA.

So China may duplicate the American breakthroughs of the 1980s and 1990s, though probably not for another decade or longer; and it is unlikely to achieve an information-based RMA in the foreseeable future. This does not necessarily mean the Chinese cannot achieve a revolution in military affairs; it is possible they will make significant breakthroughs in some other direction entirely. In fact, this could do more to shift the military balance in their favor than either of the more conventional alternatives. We would be much more likely to recognize, understand, and cope with a Chinese RMA if it followed the same path we were already on; and less likely to deal effectively with a revolutionary breakthrough based on concepts and approaches that are unfamiliar to us. We dealt much better with the Soviet conventional threat, for example, even when we thought the Soviets were ahead in key technological areas, than we did with the guerrilla warfare threat in the 1950s-1970s.

If China does achieve an RMA any time in the next quarter century, it will necessarily be through the innovative application of technology that lags somewhat behind the advancing Western state of the art. Innovation is difficult to predict, but we can make a reasonable effort based on known capabilities, circumstances, and concerns.

Fusion of Conventional and Unconventional Warfare. One avenue China is likely to pursue is the integration of high-tech conventional forces with guerrilla, militia, and paramilitary forces into a more effective form of defensive warfare. There is already considerable discussion of this approach, generally under the rubric of "people's war under high-tech conditions" (as opposed to the standard formulation of "modern local war under high-tech conditions"). For the most part, this discussion seems to be coming from the bottom up; local militia units and military districts publishing articles on how they can contribute to the brave new world of high-tech warfare. The articles have a bit of a "me too" tone about them, a rear-guard action by

the local districts trying not to get left behind as the PLA forges ahead into the realm of large-scale conventional operations. Once the PLA as a whole gets through the initial phase of defining and implementing a more advanced conventional doctrine, the leadership and doctrinal think-tanks may begin innovating and modifying that doctrine to take advantage of Chinese strengths. Chief among these strengths, at least for a battle taking place on China's home turf, is the ability to mobilize and organize huge militia and paramilitary forces to support the conventional forces. If they can develop a comprehensive doctrine for integrating guerrilla and paramilitary operations with the conventional scheme of maneuver, they might achieve the kind of beneficial synergy that constitutes a real breakthrough in military capabilities–"AirLand Battle with Chinese Characteristics," perhaps.

Precision Deep Strike. The area of military technology where China seems closest to matching Western capabilities is in building accurate, mobile, solid-fuel ballistic missiles. The latest Chinese entries, such as the M-9 SRBM (aka DF-15, aka CSS-6), seem to be achieving accuracy levels that make them useful for precision deep strike missions with conventional or improved conventional warheads. This will give the Chinese operational commander the kind of capability that his American counterpart achieves with cruise missiles, ATACMS SRBMs, precision-guided air-delivered munitions, and stealth aircraft. So far so good, but not revolutionary. Some suggest that a breakthrough may come if the Chinese give up on catching up with the West in development of airpower, and decide to put much greater emphasis on the use of surface-to-surface missiles. This would be analogous to North Korea's shift to long-range artillery to achieve capabilities the United States achieves with airpower (battlefield interdiction, close air support, etc.). Whether that would constitute a revolutionary breakthrough is open to debate; my inclination would be to say no, but, as always, the issue is whether they develop innovative doctrine for the employment of this weapon, and innovation is hard to predict. At any rate, a shift to heavy reliance on missiles would at least have implications for U.S.

force structure requirements, necessitating heavier investment in anti-ballistic missile systems.

Will They Do It?

China could make a breakthrough in one of the areas outlined above, or in some other area entirely, but on balance it does not seem likely. The PLA and the defense industries are too heavily devoted to following the technological and doctrinal paths already blazed by the Western countries–stealth technology, precision guided munitions, stand-off weapons, visualization of the battlefield, improved C^4I and avionics, etc. It will take the Chinese 10-20 years to work through these issues, before they are likely to begin diverging from the prevailing Western doctrinal themes. In the meanwhile, nothing is likely to occur that will force them to change their general direction. Even the worst-case possibilities, such as the extremely remote possibility of direct large-scale conflict with the United States, probably would not serve to make the PLA abandon its current objectives of duplicating the kind of capabilities the United States demonstrated in the Gulf War. The lesson the PLA would draw from defeat in such a conflict would be that they had to redouble their efforts to close the gap in technology and operational capabilities–not that they had to abandon that effort and strike out in some other direction entirely. In any case, such a conflict seems extremely unlikely, and no other foreseeable event seems likely to make them question their current objectives.

On its current course, the PLA will achieve significant improvements in its ability to execute large-scale joint operations in defense of the Chinese homeland, and, to a lesser extent, in its ability to project force against Taiwan or into the Spratly Islands. Over the next two decades, it may even achieve capabilities comparable to that of the U.S. armed forces in the 1990s. It is unlikely, however, that China will achieve any major breakthrough in the innovative application of technology to military operations.

U.S. ARMY WAR COLLEGE

Major General Richard A. Chilcoat
Commandant

*****

STRATEGIC STUDIES INSTITUTE

Director
Colonel Richard H. Witherspoon

Director of Research
and Conference Organizer
Dr. Earl H. Tilford, Jr.

Authors
Dr. Bates Gill
Lonny Henley

Director of Publications and Production
Ms. Marianne P. Cowling

Secretaries
Mrs. Devona A. Peck
Ms. Rita A. Rummel

*****

Composition
Mrs. Mary Jane Semple

Cover Artist
Mr. James E. Kistler