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China's Search for Assured Retaliation

The Evolution of Chinese Nuclear Strategy and Force Structure

M. Taylor Fravel and
Evan S. Medeiros

On October 16, 1964, China exploded its first nuclear weapon at the Lop Nor test facility in Xinjiang. China's subsequent development of its nuclear strategy and force structure presents a puzzle for scholars and policymakers alike. Following its initial development of nuclear weapons and ballistic missile capabilities, China built a small, unsophisticated, and, arguably, highly vulnerable nuclear force. In addition, for more than three decades, the pace of China's nuclear modernization efforts was slow and gradual despite the continued vulnerability of its force. In relative terms, China's nuclear forces were far smaller and less diverse than those of the United States or the Soviet Union both during and after the Cold War. At the same time, China did not develop detailed operational doctrine for overcoming its relative inferiority, let alone for the effective use of its arsenal. Such a nuclear posture called into question the credibility of China's ability to deter states with much larger arsenals, more refined doctrines, and more powerful conventional military forces.¹ In retrospect, the degree of vulnerability that China was willing to accept after developing nuclear weapons is striking.

Although China has sought to enhance its second-strike capability since the mid-1990s, the first three decades of China's approach to nuclear modernization and doctrinal development raises several important questions that this article seeks to answer. First, why did China maintain such a small and vulnerable nuclear force structure for so long, given that it undermined China's ability to deter nuclear aggression? Second, why did China not develop a detailed

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1. For one argument about China's vulnerability based on recent improvements in U.S. nuclear forces, see Keir A. Lieber and Daryl G. Press, "The End of MAD? The Nuclear Dimension of U.S. Primacy," *International Security*, Vol. 30, No. 4 (Spring 2006), pp. 7-44.

operational nuclear doctrine? Why, in particular, did China not pursue nuclear war-fighting concepts (and associated force structures) as a response to its nuclear and conventional inferiority? Third, now that China is modernizing its armed forces, has it changed its approach toward the requirements of a credible deterrent? Fourth, what is the trajectory of its nuclear strategy and forces?

Answers to these questions about China's nuclear posture are important for several reasons. First, China's behavior highlights an important gap in structural realist approaches to international politics.² On the one hand, structural realism arguably is indeterminate and has few clear predictions about variation in the nuclear strategies and forces that states adopt, as such questions lie beyond the scope of the theory. On the other hand, given the assumption of security maximization and Kenneth Waltz's socialization mechanism, a structural realist might expect states to highly prize the credibility of their nuclear deterrent, especially when faced with more powerful nuclear opponents that pose a clear threat to national survival, the basic goal of states in all structural theories.³ Although China engaged in security competition with the United States and the Soviet Union during the Cold War, it never sought to match their nuclear capabilities or strategies, even partially, despite possessing enough fissile material with which to build a larger, more capable arsenal.⁴

Second, examination of China's willingness to endure real nuclear vulnerability for several decades can illuminate the sources of Chinese thinking about nuclear weapons and deterrence. Such analysis is critical because China is substantially altering its nuclear force structure with the recent deployment—for the first time—of road-mobile intercontinental ballistic missile (ICBM) systems and the pending deployment of a nuclear-powered ballistic missile submarine force, both of which will increase the number of warheads capable of striking the United States. These changes raise important questions: some scholars and analysts argue that China may be moving toward nuclear war-fighting strategies and a major increase in the size of its arsenal;⁵ others emphasize the challenge that these new forces may pose to crisis stability.⁶ We argue that the notion of assured retaliation, or deterring an adversary with the threat of unac-

2. John J. Mearsheimer, *The Tragedy of Great Power Politics* (New York: W.W. Norton, 2001); and Kenneth N. Waltz, *Theory of International Politics* (New York: McGraw-Hill, 1979).

3. Waltz, *Theory of International Politics*.

4. David Albright and Corey Hinderstein, "Chinese Military Plutonium and Highly Enriched Uranium Inventories," Institute for Science and International Security, June 30, 2005, http://isis-online.org/uploads/isis-reports/documents/chinese_military_inventories.pdf.

5. See, for example, Mark Schneider, "The Nuclear Doctrine and Forces of the People's Republic of China," *Comparative Strategy*, Vol. 28, No. 3 (July/August 2009), pp. 244–270; and Larry M. Wortzel, *China's Nuclear Forces: Operations, Training, Doctrine, Command, Control, and Campaign Planning* (Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, May 2007).

6. Michael S. Chase, Andrew S. Erickson, and Christopher Yeaw, "Chinese Theater and Strategic

ceptable damage through a retaliatory nuclear strike, offers a useful framework for understanding the evolution of China's nuclear strategy and force structure.

In the literature on China's nuclear weapons, however, few scholars have explored the origins of Chinese beliefs about the roles and missions of nuclear weapons and, as a consequence, the drivers of nuclear force development. One line of inquiry examines China's decision to acquire nuclear weapons, including the seminal works by Alice Hsieh as well as John Lewis and Xue Litai on the history of China's strategic weapons programs.⁷ Another line of inquiry probes how best to characterize China's nuclear strategy. Much of the debate revolves around whether China pursues either minimum deterrence or limited deterrence.⁸ Minimum deterrence refers to "threatening the lowest level of damage necessary to prevent attack, with the fewest number of nuclear weapons possible."⁹ Similarly, limited deterrence "requires a limited war-fighting capability to inflict costly damage on the adversary at every rung on the escalation ladder, thus denying the adversary victory in a nuclear war."¹⁰ The mainstream view remains that minimum deterrence best captures the essence of China's approach.¹¹ Finally, other scholars argue that China has adopted a

Missile Force Modernization and Its Implications for the United States," *Journal of Strategic Studies*, Vol. 32, No. 1 (February 2009), pp. 67–114.

7. Alice Langley Hsieh, *Communist China's Strategy in the Nuclear Age* (Englewood Cliffs, N.J.: Prentice-Hall, 1963); John Wilson Lewis and Xue Litai, *China Builds the Bomb* (Stanford, Calif.: Stanford University Press, 1988); and John Wilson Lewis and Xue Litai, *China's Strategic Seapower: The Politics of Force Modernization in the Nuclear Age* (Stanford, Calif.: Stanford University Press, 1994).

8. The classic example of this debate is found in Alastair Iain Johnston, "China's New 'Old Thinking': The Concept of Limited Deterrence," *International Security*, Vol. 20, No. 3 (Winter 1995/96), pp. 5–42. On minimum deterrence, see Avery Goldstein, *Deterrence and Security in the 21st Century: China, Britain, France, and the Enduring Legacy of the Nuclear Revolution* (Stanford, Calif.: Stanford University Press, 2000); Jeffrey Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age* (Cambridge, Mass.: MIT Press, 2007); and Litai Xue, "Evolution of China's Nuclear Strategy," in John C. Hopkins and Weixing Hu, eds., *Strategic Views from the Second Tier: The Nuclear Weapons Policies of France, Britain, and China* (San Diego: University of California Press, 1994), pp. 167–190. For an effort to bridge these arguments, see Bates Gill, James C. Mulvenon, and Mark Stokes, "The Chinese Second Artillery Corps: Transition to Credible Deterrence," in Mulvenon and Andrew N.D. Yang, eds., *The People's Liberation Army as Organization* (Santa Monica, Calif.: RAND, 2002), pp. 510–586.

9. Committee on the U.S.-Chinese Glossary of Nuclear Security Terms, *English-Chinese, Chinese-English Nuclear Security Glossary* (Washington, D.C.: National Academies Press, 2008), p. 36.

10. *Ibid.*, pp. 33–34. See also Johnston, "China's New 'Old Thinking.'"

11. See Hsieh, *Communist China's Strategy in the Nuclear Age*; Lewis and Xue, *China Builds the Bomb*, p. 216; and Lewis and Xue, *China's Strategic Seapower*; as well as Chu Shulong and Rong Yu, "China: Dynamic Minimum Deterrence," in Muthiah Alagappa, ed., *The Long Shadow: Nuclear Weapons and Security in 21st Century Asia* (Stanford, Calif.: Stanford University Press, 2008), pp. 161–214; Brad Roberts, *China and Ballistic Missile Defense: 1955 to 2002 and Beyond*, IDA Paper P-3826 (Alexandria, Va.: Institute for Defense Analysis, September 2003); and Brad Roberts, Robert A. Manning, and Ronald N. Montaperto, "China: The Forgotten Nuclear Power," *Foreign Affairs*, Vol. 79, No. 4 (July/August 2000), pp. 53–63.

distinctively Chinese approach heavily influenced by China's strategic tradition associated with Sun Zi and traditional strategic thought.¹²

Conclusions about China's approach to nuclear strategy are often grounded in assessments of China's force structure, not in Chinese beliefs or authoritative military writings about the contribution of nuclear weapons to deterrence. In a 2007 study, for example, Jeffrey Lewis claims that China possesses a unique view of deterrence in which Chinese leaders believe that deterrence is a relatively easy objective that can be achieved with few nuclear weapons.¹³ The basis for Lewis's argument, however, is not the beliefs and attitudes of Chinese leaders and strategists. Instead, he infers this strategic preference from the small size of China's force, writing that "Chinese policy makers have tended to make decisions about China's strategic forces that suggest a widespread belief that deterrence is achieved early and with a small number of forces."¹⁴

We offer two explanations for the slow pace and shallow trajectory in the development of China's nuclear strategy and forces until the mid-1990s. The first explanation is ideational. The views and beliefs of China's top leaders, mainly Mao Zedong and Deng Xiaoping, had a consistently dominant influence on Chinese nuclear strategy. The salience of their views continued well after their deaths in 1976 and 1997, respectively. Both leaders viewed nuclear weapons, primarily and probably exclusively, as tools for deterring nuclear aggression and countering coercion, not as weapons to be used in combat to accomplish discrete military objectives. Both leaders embraced the idea of deterrence through assured retaliation, in which a small number of survivable weapons would be enough to retaliate and impose unacceptable damage on an adversary, even if the concepts of survivability and unacceptable damage were left undefined for decades.¹⁵ No evidence exists that either Mao or Deng possessed views on the operational requirements of credible deterrence vis-à-vis China's potential adversaries. One important implication of these beliefs is that the concept of assured retaliation, not minimum deterrence, best captures China's approach to nuclear weapons.

Our second explanation points to multiple organizational and political constraints on the ability of the People's Liberation Army (PLA) to develop

12. Chong-pin Lin, *China's Nuclear Weapons Strategy: Tradition within Evolution* (Lexington, Mass.: Lexington Books, 1988).

13. Lewis, *The Minimum Means of Reprisal*.

14. Jeffrey Lewis, "Minimum Deterrence," *Bulletin of the Atomic Scientists*, Vol. 64, No. 3 (July/August 2008), p. 40.

15. For a theoretical examination of the deterrent effect of a posture of assured retaliation, see Vipin Narang, "Posturing for Peace? Pakistan's Nuclear Postures and South Asian Stability," *International Security*, Vol. 34, No. 3 (Winter 2009/10), pp. 38–78.

nuclear strategy and an associated operational doctrine. As a result of the Cultural Revolution (1966–76), the PLA for two decades after testing its first weapon lacked the experience and the expertise to do so; the military began to formulate its nuclear strategy and operational doctrine only in the mid-1980s, with the further advances coming in the 1990s. Also, China's political environment was not conducive to such work on strategy and doctrine. Nuclear issues were treated with intense secrecy, limiting knowledge of them and, thus, opportunities for interagency deliberations. Party-led civil-military relations in China and the strength of the Chinese Communist Party (CCP) meant that Mao's and Deng's views on military strategy, including nuclear weapons, were not questioned for decades.

Despite major changes in China's external security environment, economic resources, and technological capabilities, its approach to nuclear strategy and force structure has been relatively consistent since the 1960s. As China developed and revised its operational doctrine for the use of nuclear weapons beginning in the mid-1980s, it continued to stress deterring nuclear attacks against China and has not shifted to pursue nuclear war fighting. Changes in the composition of China's nuclear forces have, on balance, emphasized increasing quality over quantity in an effort to achieve a secure second-strike capability—albeit with an understanding that quantity matters in a world in which nuclear powers also possess strategic defenses. Indeed, such constant policies are perhaps rare, not just in the military arena but in national security policy more generally.

Before proceeding, we must mention one caveat. Any assessment of Chinese leaders' beliefs about the utility of nuclear weapons and the requirements of deterrence must begin with the observation that primary source data remain scarce but are growing. Within the study of contemporary China, military and security issues are among the most challenging because of the limited access to government documents and leadership statements. And within the study of Chinese military and security affairs, problems of data availability are most acute regarding nuclear issues, in part a reflection of China's decision to maintain ambiguity regarding multiple attributes of its force.¹⁶ To overcome these challenges, we tap a range of Chinese-language materials, some of which have become available only in the past decade. One set of materials includes

16. On using Chinese open sources to research the PLA, see Evan S. Medeiros, "Undressing the Dragon: Researching the PLA through Open Source Exploitation," in James C. Mulvenon and Andrew N.D. Yang, eds., *A Poverty of Riches: New Challenges and Opportunities in PLA Research* (Santa Monica, Calif.: RAND, 2001), pp. 119–168; and M. Taylor Fravel, "The Revolution in Research Affairs: Online Sources and the Study of the PLA," in Mulvenon and Yang, *A Poverty of Riches*, pp. 49–118.

publications by military academies and scholars on questions of military strategy and doctrine, such as multiple editions of *Zhanlue Xue* (The Science of Strategy) and *Zhanyi Xue* (The Science of Campaigns) as well as *Zhanyi Lilun Xuexi Zhinan* (Campaign Theory Study Guide). A second set of materials includes party history documents, such as the memoirs (*huiyilu*), chronologies (*nianpu*), and selected military works (*junshi wenxuan*) of key political elites involved in China's nuclear weapons programs, especially Mao Zedong, Deng Xiaoping, Nie Rongzhen, and Zhang Aiping.

This article proceeds as follows. To set the empirical foundation for our argument, the next section elaborates in more detail the puzzling nature of Chinese behavior. The following two sections include our explanation for China's vulnerability, leadership beliefs, and domestic constraints. Then, the article examines the continued role of leadership beliefs in China's doctrinal development and force modernization over the past two decades as domestic constraints were reduced. Finally, it addresses the implications of our arguments for the future of Chinese nuclear strategy and forces.

The Puzzling Nature of China's Nuclear Behavior

China's development of nuclear weapons presents two key puzzles worthy of explanation. First, for decades China was apparently content with a small nuclear force that was vulnerable to a first strike and whose survivability was highly questionable. Second, despite its nuclear vulnerability, China failed to develop a declaratory strategy or operational doctrine to compensate for its quantitative weakness relative to adversaries with larger, more capable arsenals.

A SMALL AND VULNERABLE ARSENAL

Since China exploded its first nuclear weapon in 1964, the growth of its nuclear force has been strikingly slow in relation to the nuclear arsenals of its adversaries. Following the militarization of the Chinese-Soviet border in the mid-1960s and overt threats against China's nuclear weapons facilities in the summer of 1969, China did not develop a robust nuclear deterrent against the Soviet Union. China similarly lacked a robust deterrent against the United States in the 1960s.¹⁷

China's vulnerability has had two basic dimensions. First, China's arsenal

17. To be sure, after the end of the Cold War, China accelerated its nuclear modernization efforts as relations with the United States deteriorated and the potential for conflict across the Taiwan Strait with the United States increased. We address this change in force structure below.

was small and unsophisticated. Although reliable data on the size of China's arsenal remain elusive, estimates indicate that a decade after exploding its first nuclear device, China likely possessed only 75 nuclear warheads and tens of gravity bombs. Another decade later, in 1985, after its confrontation with the Soviet Union peaked, China may have possessed as many as 151 nuclear warheads, roughly half of what Britain and France possessed at the time.¹⁸ Likewise, China today possesses around 120 nuclear warheads.¹⁹ Finally, between 1964 and 1996 (the year it signed the Comprehensive Test Ban Treaty [CTBT]), China conducted only forty-five nuclear tests, less than 3 percent of the number of tests performed by the United States and the Soviet Union.

For three decades, China's nuclear force also lacked diversity and technological sophistication. China never developed an operational nuclear triad, let alone robust delivery systems by individual services. Before the 1980s, China possessed only tens of DF-3 medium-range ballistic missiles (MRBMs) and DF-4 intermediate-range ballistic missiles (IRBMs) to strike Soviet targets in the Russian Far East and potentially U.S. bases in the Asia-Pacific.²⁰ Moreover, Chinese missiles faced severe operational constraints. They were vulnerable to a first strike because they required lengthy and onerous preparation before launching. Most were stored in caves and had to be rolled out and erected to be launched. They were also liquid fueled (including some with nonstorable propellants), in a process that required lengthy and complex preparation before launching. Moreover, China did not possess its first ICBM capable of striking either Moscow or Washington, the DF-5, until the early 1980s. By the early 1990s, China reportedly possessed only four DF-5s.²¹ Even then, China's ICBM force grew only to twenty missiles by the mid-to-late 1990s. Unlike China's intermediate- and medium-range missiles, DF-5s were even more vulnerable to a first strike because they were based in fixed silos, and their three-stage propulsion system had particularly extensive and dangerous fueling requirements.

The other two legs of China's triad were even weaker than its land-based missiles. Although China may have developed as many as 130 nuclear gravity bombs, its nuclear bomber force, composed mostly of H-6 bombers, could reach targets only in the Russian Far East or Japan. Moreover, China's bombers were unsheltered and were seldom placed on alert. Given the PLA Air Force's

18. Robert S. Norris, Andrew S. Burrows, and Richard W. Fieldhouse, *Nuclear Weapons Databook*, Vol. 5: *British, French, and Chinese Nuclear Weapons* (Boulder, Colo.: Westview, 1994), p. 359.

19. Robert S. Norris and Hans M. Kristensen, "Chinese Nuclear Forces, 2008," *Bulletin of the Atomic Scientists*, Vol. 64, No. 3 (July/August 2008), p. 43.

20. Norris, Burrows, and Fieldhouse, *Nuclear Weapons Databook*, Vol. 5, p. 359.

21. This important claim about the DF-5 was made in John Wilson Lewis and Hua Di, "China's Ballistic Missile Programs: Technologies, Strategies, Goals," *International Security*, Vol. 17, No. 2 (Fall 1992), p. 19.

very limited training, these planes most likely would not have reached their intended targets. Likewise, China launched one Xia-class nuclear-powered ballistic missile submarine (SSBN) in 1985, but the program encountered numerous difficulties surrounding the testing of its JL-1 missile. Moreover, this sole SSBN never conducted a single deterrent patrol before it was refitted in the mid-1990s.²²

China's weak command and control infrastructure for its nuclear forces further enhanced the vulnerability of its nuclear weapons. China's military mainly relied on radio-frequency communications equipment that could be disabled in a first strike, if not incapacitated by the interference associated with a highly scintillated atmosphere following an initial nuclear blast.²³ China possessed no medium- or long-range air defenses for its air bases or missile launch sites, and it lacked a ballistic missile early-warning capability for an impending nuclear attack. China's nationwide ground-based nuclear detonation network was not developed until the late 1980s, more than twenty years after its first test.²⁴

The second feature of China's vulnerability is its small size and lack of diversity relative to U.S. and Soviet nuclear capabilities during the Cold War. As figure 1 demonstrates, the U.S. and Soviet arsenals of warheads were more than fifty times larger than China's in the mid-1980s. A similar pattern exists when comparing numbers and types of delivery systems, as the superpowers had roughly fifty to seventy times the number of ICBM launchers. Both the United States and the Soviet Union possessed numerous types of short-, medium-, and long-range missile systems. Many of the latter two varieties were deployed with multiple warheads, further increasing the destructive power of an individual missile. Even greater disparities between China and the others existed regarding bombers and SSBNs. Moreover, China's force structure also lacked diversity compared with those of smaller nuclear powers such as Britain and France, which deployed SSBNs in the late 1960s and early 1970s.

LIMITED DOCTRINAL DEVELOPMENT

In addition to limited investment in its force structure, China for more than three decades lacked a detailed declaratory strategy or operational doctrine for the use of its nuclear weapons. Following its first test of a nuclear device in

22. Hans M. Kristensen, Robert S. Norris, and Matthew G. McKinzie, *Chinese Nuclear Forces and U.S. Nuclear War Planning* (Washington, D.C.: Federation of American Scientists/Natural Resources Defense Council, November 2006), p. 89.

23. James C. Mulvenon, "Chinese C⁴I Modernization: An Experiment in Open-Source Analysis," in Mulvenon and Yang, *A Poverty of Riches*, pp. 193–208.

24. Kevin Pollpeter, Michael S. Chase, Johanna G. Cox, and Garth Hekler, *Chinese Nuclear Command and Control* (Washington, D.C.: Center for Intelligence Research and Analysis, August 2006).

Figure 1. U.S., Soviet/Russian, and Chinese Warheads, 1958–2008



SOURCE: Robert S. Norris, Andrew S. Burrows, and Richard W. Fieldhouse, *Nuclear Weapons Databook*, Vol. 5: *British, French, and Chinese Nuclear Weapons* (Bolder, Colo.: Westview, 1994), p. 359; "Archive of Data," Natural Resources Defense Council, <http://www.nrdc.org/nuclear/nudb/datainx.asp>; and "Nuclear Notebook," *Bulletin of the Atomic Scientists*, various years.

1964, China announced two policies (*zhengce*) guiding its approach to nuclear weapons—a no-first-use pledge and opposition to arms races—but for decades it did not outline either publicly or internally a strategy that would govern their development and operation. As John Lewis and Xue Litai have argued, the technological availability of weapons systems (e.g., longer-range and more accurate missiles and bombers) drove China's nuclear modernization in the 1960s and 1970s, efforts informed by Mao's ideas about possessing a small number of quality weapons (as discussed in the following section). The fact that China's defense industrial establishment was part of the PLA at this time facilitated the close relationship between technology and strategy in nuclear modernization.

Chinese research on nuclear strategy and doctrine, however, did not begin in earnest until the mid-1980s. At that time, the Second Artillery (*di'er paobing*, China's strategic rocket forces) began to conduct basic work on the principles to guide nuclear operations. The principles the PLA did develop were quite

simple and focused on ensuring the survivability of Chinese forces, as a means of bolstering the credibility of China's deterrent. Beyond the emphasis on improving survivability (which was itself narrowly focused on ambiguity about basing, force size, and decoys), this nascent doctrinal development was not reflected in efforts to compensate for China's relative weaknesses, either nuclear or conventional, against stronger adversaries.²⁵ In other words, China's doctrinal development was linked only loosely to its security environment.

The contrast between China's approach and the nuclear doctrines of the Soviet Union and the United States is striking and illuminating. During the Cold War, Moscow and Washington developed highly detailed doctrines for the use of nuclear weapons as tools of actual war fighting, such as intrawar escalation control; we maintain that China did not do so.²⁶ Both Soviet and U.S. doctrines were sophisticated and intimately tied to assessments of the other's nuclear and conventional capabilities. The Soviet Union under Nikita Khrushchev adopted an offensive strategy that envisioned the first use of nuclear weapons to compensate for the lower quality of its infantry in the early 1960s. By the 1980s, Soviet military planners had come to believe that nuclear war was winnable, it pays to strike first, restraint is foolhardy, and force numbers matter.²⁷ Similarly, when faced with conventional inferiority in Central Europe, for example, the United States developed war-fighting concepts (and tactical nuclear weapons) to bolster extended deterrence in Europe.²⁸

Leadership Beliefs about Nuclear Weapons and Nuclear Deterrence

Our first explanation for the slow development of China's nuclear strategy and forces focuses on the views of China's top leaders. Given the centralized nature of the Chinese political system and the subordination of the armed forces to the CCP, leadership beliefs and ideas have dominated China's approach to nuclear strategy. Both Mao Zedong and Deng Xiaoping viewed nuclear weapons as tools for deterring nuclear aggression and coercion, not as tools to be used in combat to accomplish discrete military aims. They also adhered to the

25. "Di'er paobing junshi xueshu" [Second Artillery military studies], in *Junshixue yanjiu huigu yu zhanwang* [Military academic research review and prospects] (Beijing: Junshi kexue chubanshe, 1995), pp. 358–371. Hereafter this book will be referred to as *JXYHZ*.

26. For an overview of Cold War nuclear doctrines, see Lawrence Freedman, *The Evolution of Nuclear Strategy* (New York: St Martin's, 1981), pp. 245–249; and Lawrence Freedman, "The First Two Generations of Nuclear Strategists," in Peter Paret, ed., *Makers of Modern Strategy from Machiavelli to the Nuclear Age* (Princeton, N.J.: Princeton University Press, 1986), pp. 735–778.

27. John G. Hines, Ellis M. Mishulovich, and John F. Shull, *Soviet Intentions, 1965–1985*, Vol. 1: *An Analytical Comparison of U.S.-Soviet Assessments during the Cold War*; and Vol. 2: *Soviet Post-Cold War Testimonial Evidence* (McLean, Va.: BDM Federal, September 22, 1995).

28. Desmond Ball, "U.S. Strategic Forces: How Would They Be Used?" in Steven E. Miller, ed., *Strategy and Nuclear Deterrence* (Princeton, N.J.: Princeton University Press, 1984).

idea of assured retaliation, namely, that a small number of survivable weapons would be enough to accomplish deterrence by threatening retaliation and, thus, unacceptable damage on an adversary, even though these latter concepts were left undefined. Moreover, no evidence exists to indicate that either Mao or Deng possessed beliefs about the operational requirements of a credible second-strike capability.

WHAT IS THE UTILITY OF NUCLEAR WEAPONS?

Since the founding of the People's Republic in 1949, China's senior political and military leaders have emphasized that nuclear weapons are principally useful for two reasons: deterring a nuclear attack and countering nuclear coercion. To be sure, the atomic bomb was seen as imparting other benefits, notably, demonstrating China's status as a major power in the international community and serving as a source of national pride for the Chinese people. These latter functions, however, are less central to understanding the slow pace of China's nuclear force modernization and doctrinal development until the 1990s and are not examined in detail below. Senior Chinese leaders never viewed nuclear weapons as a means for fighting or winning wars. Finally, what is striking about China's attitudes toward nuclear weapons described below is that these leadership views have remained relatively constant from Mao Zedong in the 1950s to Hu Jintao today.

DETECTING NUCLEAR AGGRESSION. For China's top leaders, the most important function of nuclear weapons is their ability to deter nuclear attacks on China. Despite Mao Zedong's well-known denigration of nuclear weapons as "paper tigers," he saw the value in such weapons for deterring their use against China by the United States and later the Soviet Union.²⁹ Mao was keenly aware of China's vulnerability to nuclear strikes and the need for a solution to this problem. Writing in 1950 during the Korean War, for example, Mao observed, "If the US strikes with atomic bombs, we have none and can only allow it to strike. This is something that we cannot resolve."³⁰ Twenty

29. Mao Zedong, *Mao Zedong wenji* [Mao Zedong's collected works], Vol. 7 (Beijing: Xinhua chubanshe, 1999), p. 328. For an excellent summary of Chinese leadership views and China's approach to nuclear strategy, see Yao Yunzhu, "Chinese Nuclear Policy and the Future of Minimum Deterrence," in Christopher P. Twomey, ed., *Perspectives on Sino-American Strategic Nuclear Issues* (New York: Palgrave Macmillan, 2008), pp. 111–124. Yao is a senior colonel and an expert on nuclear issues at the PLA's Academy of Military Science. For a detailed analysis of Mao's approach to nuclear weapons, see Cai Lijuan, *Mao Zedong de hezhanlue sixiang yanjiu* [Mao Zedong's nuclear strategic thought], Institute of International Studies, Tsinghua University, 2002. On Chinese thinking on nuclear weapons during the late 1940s and 1950s, see Hsieh, *Communist China's Strategy in the Nuclear Age*; and Mark A. Ryan, *Chinese Attitudes toward Nuclear Weapons: China and the United States during the Korean War* (Armonk, N.Y.: M.E. Sharpe, 1989).

30. Quoted in Yin Xiong and Huang Xuemei, *Shijie yuanzidan fengyunlu* [The stormy record of the atomic bomb in the world] (Beijing: Xinhua chubanshe, 1999), p. 258.

years later, in 1970 Mao noted the deterrent role of nuclear weapons in U.S.-Soviet superpower competition. In meeting with a delegation from North Vietnam, he stated that “although the possibility of the major powers fighting a world war remains, everyone does not dare to start such a war only because they have nuclear weapons.”³¹ Mao clearly embraced the notion of mutual deterrence, which was reflected in the statement that China issued after its first test of a nuclear device in October 1964.

Mao was not alone among his generation of Chinese leaders in stressing the deterrent function of nuclear weapons. Zhou Enlai, for example, held similar views. Observing the deterrent effect created by the possession of chemical weapons after World War I, another weapon of mass destruction, Zhou stated in 1955 that “now it is possible that the use of atomic weapons can also be prohibited.”³² Elsewhere Zhou was blunter, arguing, “If we don’t have missiles, then the imperialists can use missiles [against us].”³³ Zhou’s remark reflected the PLA’s focus in the 1950s on preparing to fight a conventional war after the United States used nuclear weapons as part of an attack against China.³⁴

China’s second generation of leaders, especially Deng Xiaoping, similarly emphasized the deterrent role of nuclear weapons. During a 1975 meeting with the prime minister of Guyana, Deng alluded to the deterrent function of these weapons, stating that “France has also built some [nuclear weapons]. We understand [why] France has built them. Britain has also made some, but not many. Our reason for building a few is that we will have them if they have them. Nuclear weapons have only this function.”³⁵ Although only by implication, Deng was referring to their deterrent role. Later that year, Deng likewise told officials from the Seventh Machine Industry (Aerospace), which was responsible for developing China’s ballistic missiles, “We must have some deterrent force (*weishe lilian*) if they also have it. We are unable to do too much, but to have it is useful.”³⁶

Finally, China’s third generation of top political leaders stressed the de-

31. *Mao Zedong yu Zongguo yuanzineng shiye* [Mao Zedong and China’s nuclear energy industry] (Beijing: Yuanzineng chubanshe, 1993), p. 13, quoted in Cai, *Mao Zedong de hezhanlue sixiang yanjiu*, p. 18.

32. Zhou Enlai, *Zhou Enlai junshi wenxuan* [Zhou Enlai’s selected works on military affairs], Vol. 4 (Beijing: Renmin chubanshe, 1997), p. 360.

33. *Ibid.*, p. 422.

34. See, for example, Ye Jianying, *Ye Jianying junshi wenxuan* [Ye Jianying’s selected works on military affairs] (Beijing: Jiefangjun chubanshe, 1997), pp. 244–251.

35. Deng Xiaoping, *Deng Xiaoping junshi wenxuan* [Deng Xiaoping’s selected works on military affairs], Vol. 3 (Beijing: Junshi kexue chubanshe, 2004), p. 15. In this context, “they” refers to other nuclear weapons states, especially the United States and the Soviet Union.

36. Leng Rong and Wang Zuoling, eds., *Deng Xiaoping nianpu, 1975–1997* [Chronicle of Deng Xiaoping’s life, 1975–1997] (Beijing: Zhongyang wenxian chubanshe, 2004), p. 351.

terrent role of nuclear weapons. During a speech to the Central Military Commission in 2002, Jiang Zemin stated, “International society attaches more and more importance to containing war or delaying the outbreak of war, and avoiding or reducing the devastation of war, through strategic deterrence (*zhanlue weishe*). Strategic deterrence has already become an important part of international military competition. The United States, Russia, Britain, France, and other nuclear powers all regard nuclear weapons as the core force of strategic deterrence.”³⁷ Although few primary source documents on Hu Jintao’s approach to military affairs have been published, authoritative articles by senior military scholars have continued to stress this view of nuclear weapons since Hu became general secretary of the CCP in 2002.³⁸

RESISTING NUCLEAR COERCION. China’s senior political and military leaders, especially the first generation of leaders, stressed another role for nuclear weapons: as a means to resist intimidation and blackmail by nuclear-armed states. Generally speaking, this refers to the use of nuclear weapons in coercive diplomacy when a nuclear weapons state threatens a state without nuclear weapons.³⁹ Ironically, one reason why Mao likely disparaged the atomic bomb as a “paper tiger” was instrumental, namely, to persuade the Chinese public not to be intimidated by the highly destructive weapons possessed by China’s opponents.⁴⁰

The need to resist or counter intimidation is a theme that runs through Mao’s limited references to nuclear weapons. During the first meeting of the National Defense Commission in 1954, for example, Mao noted, “Imperialists [i.e., the United States] assess that we only have a few things and then they come to bully us. They say, ‘how many atomic bombs do you have?’”⁴¹ When

37. Jiang Zemin, *Jiang Zemin wenxuan* [Jiang Zemin’s selected works], Vol. 3 (Beijing: Renmin chubanshe, 2006), p. 585.

38. See Jing Zhiyuan and Peng Xiaoteng, “Huiguo di’er paobing zai gaige kafang zhong jiakuai jianshe fazhan de guanghui licheng” [Recalling the brilliant process of accelerated building and development of the Second Artillery Corps during reform and opening], in *Di’er paobing zhengzhi bu*, ed., *Huihuang niandai: Huigu zai gaige kaifang zhong fazhan qianjin de di’er paobing* [Glorious era: Reviewing the Second Artillery’s development and advances during reform and opening] (Beijing: Zhongyang wenxian chubanshe, 2008), pp. 1–22. Jing and Peng are the commander and political commissar, respectively, of the Second Artillery. See also Zhou Kekuan, “New Developments in the Theory and Practice of Nuclear Deterrence in the New Period” [Xin shiqi heweishe lilun yu shixian de xin fazhan], *Zhongguo junshi kexue*, No. 1 (2009), pp. 16–20.

39. Based on Mao’s concern with blackmail, one prominent Chinese scholar has argued that China’s deterrent is best characterized as “counter nuclear coercion (*fan he weiyu*).” See Li Bin, “Zhongguo hezhanlue bianxi” [Analysis of China’s nuclear strategy], *Shijie jingji yu zhengzhi*, No. 9 (2006), pp. 16–22.

40. Ryan, *Chinese Attitudes toward Nuclear Weapons*, p. 17; and Ralph L. Powell, “Great Powers and Atomic Bombs Are ‘Paper Tigers,’” *China Quarterly*, No. 23 (July–September, 1965), pp. 55–63.

41. Mao Zedong, *Mao Zedong junshi wenji* [Mao Zedong’s selected works on military affairs], Vol. 6 (Beijing: Junshi kexue chubanshe, 1993), p. 359.

meeting with French parliamentarians in 1964 before China's first nuclear test, Mao argued, "With batches and batches of nuclear weapons in the United States and Soviet Union, they often shake them in their hands to intimidate people."⁴² Likewise, Marshal Nie Rongzhen, one of the key figures in China's strategic weapons programs, also noted their utility in countering blackmail. Observing that the United States feared China's possession of nuclear weapons, Nie stated that "when the Chinese people have this weapon, [the United States'] nuclear blackmail toward the people of the world will be completely destroyed."⁴³

Mao's focus on coercion and blackmail reflected the initial decision to pursue nuclear weapons. In his famous 1956 speech "On the Ten Great Relationships," Mao noted, "We want to have not only more planes and heavy artillery, but also the atomic bomb. In today's world, if we don't want to be bullied, then we cannot do without this thing."⁴⁴ During a 1958 meeting of the Central Military Commission, Mao again focused on how possession of nuclear weapons could prevent nuclear coercion. In particular, he linked them with the ability to stand up to stronger states, noting that "[we] also want that atomic bomb. I hear that with such a big thing, if you don't have it, then others will say that you don't count. Fine, we should build a few."⁴⁵

Although China's concern with nuclear coercion was perhaps most evident during the early Cold War period, other generations of Chinese leaders have also emphasized this function. In 1975, for example, Deng Xiaoping told a delegation of foreign visitors that China does "not advocate nuclear proliferation at all, but we even more strongly oppose nuclear monopolies."⁴⁶ Similarly, Jiang Zemin observed that by acquiring the bomb in the 1960s, China "smashed the U.S.-Soviet nuclear monopoly and nuclear blackmail, making our country one of the world's few nuclear weapons states."⁴⁷

AVOIDING NUCLEAR WAR FIGHTING. Finally, China's senior political and military leaders agreed that nuclear weapons lacked any meaningful war-fighting or war-winning function. Mao Zedong, of course, stressed that only people and not weapons enabled countries to win wars. After the U.S. strikes on Hiroshima and Nagasaki in August 1945, for example, he concluded that nuclear weapons could not resolve wars, in general, or force Japan to surrender,

42. Mao, *Mao Zedong wenji*, Vol. 8, p. 370.

43. Nie Rongzhen, *Nie Rongzhen junshi wenxuan* [Nie Rongzhen's selected works on military affairs] (Beijing: Jiefangjun chubanshe, 1992), p. 498.

44. Mao, *Mao Zedong wenji*, Vol. 7, p. 27.

45. Mao, *Mao Zedong junshi wenji*, Vol. 6, p. 374.

46. Leng and Wang, *Deng Xiaoping nianpu*, p. 92.

47. Jiang, *Jiang Zemin wenxuan*, Vol. 2, p. 269.

in particular. For Mao, “With only atomic bombs and without people’s struggles, then atomic bombs are meaningless.”⁴⁸ Indeed, Mao’s writings on military affairs are replete with references to the superiority of people over weapons on the battlefield, a view that was central to the main strategic problem that the CCP encountered before and after 1949, namely, defeating an adversary with superior weapons and equipment. China’s early leaders also viewed nuclear weapons as blunt instruments that were hard to use on the battlefield. When Marshal Ye Jianying discussed the appearance of tactical nuclear weapons in a 1961 speech, he noted that “the use of atomic weapons is subject to certain conditions. They cannot be used to strike at any time or at any target as one pleases.”⁴⁹ Marshal Ye further observed that terrain, climate, and battlefield developments all influenced whether nuclear weapons could be employed.

Few Chinese leaders’ statements assessing the wartime utility of nuclear weapons are available. What is most notable is the absence of such statements (along with any serious effort to develop theater nuclear weapons or robust command and control systems for their use). Nevertheless, other senior Chinese leaders shared Mao’s and Ye’s view about the minimal utility of nuclear weapons. By the mid-1970s, Deng Xiaoping had concluded that the United States and the Soviet Union were unlikely to fight a nuclear war, despite the development of doctrines in both countries that detailed nuclear war-fighting strategies. According to Deng, because “the US and USSR today both have so many atomic bombs, so if war breaks out who will throw the first one if they fight a war—this is not an easy decision to make. . . . A future world war will not necessarily be a nuclear war. This is not only our view, but the Americans and Soviets also believe that in the future it is quite likely that conventional wars will be fought.”⁵⁰ Implicitly, then, for Deng, nuclear war fighting was not a war-winning approach.

WHAT DETERS NUCLEAR AGGRESSION AND RESISTS COERCION?

To deter a nuclear attack or resist nuclear blackmail, China could have adopted any of a variety of options. It chose, however, a conservative one. For many decades, China pursued an approach keyed to a small arsenal, which was the smallest of the arsenals of the five declared nuclear weapons states and the one that was most vulnerable to a first strike. Implicit in the development of any

48. Mao Zedong, *Mao Zedong xuanji* [Mao Zedong’s selected works], 2d ed., Vol. 4, pp. 1133–1134.

49. Ye, *Ye Jianying junshi wenxuan*, p. 490.

50. Deng, *Deng Xiaoping junshi wenxuan*, Vol. 2, p. 263. See also Leng and Wang, *Deng Xiaoping nianpu*, p. 101.

nuclear arsenal is a set of beliefs about deterrence. China's top leaders, across several generations, embraced the notion of deterrence through assured retaliation, or the belief that a small number of survivable weapons would be enough to impose unacceptable damage in a retaliatory strike and thus deter nuclear aggression.⁵¹

The emphasis on building a small arsenal began with Mao Zedong, whose ideas regarding the size of China's nuclear force along with a simplistic notion of deterrence endured for decades. In 1960 Mao suggested that a few weapons would be sufficient for deterrence, stating, "Our country in the future may produce a few atomic bombs, but we by no means intend to use them. Although we do not intend to use them, why produce them? We will use them as a defensive weapon."⁵² A few months after China's successful first nuclear test, Mao observed in an interview with Edgar Snow, "We don't wish to have too many atomic bombs ourselves. What would we do with so many? To have a few is just fine."⁵³

China's idea of deterrence, then, was not a question of nuclear equivalency with adversaries, but only the assurance that China could retaliate. Deng Xiaoping offered the most complete statement of Chinese leadership beliefs about nuclear deterrence during a meeting with the Canadian prime minister in 1983: "We have a few nuclear weapons. France also has a few. These weapons themselves are useful only for [creating] pressure. We have said many times that is the point of our few nuclear weapons! Only to show that we also have what they have. If they want to destroy us, they themselves will also suffer some retaliation. We have consistently said that we want to force the superpowers not to dare to use nuclear weapons. In the past, this was to deal with the Soviet Union, to force them not to use these weapons rashly. To have even only a few weapons after all is a kind of restraining force (*zhiyue lilian*)."⁵⁴ The implication in Deng's remarks is that the ability to inflict "some retaliation" is necessary to deter an opponent, even a superpower.⁵⁵ Because of China's no-first-use pledge, retaliation could be inflicted only after China had been attacked with nuclear weapons. As Marshal Nie Rongzhen famously described

51. On force requirements, see Yao, "Chinese Nuclear Policy and the Future of Minimum Deterrence," pp. 114–115.

52. Mao Zedong, *Mao Zedong waijiao wenxuan* [Mao Zedong's selected works on diplomacy] (Beijing: Shijie zhishi chubanshe, 1994), p. 540.

53. Mao, *Mao Zedong wenji*, Vol. 8, p. 407.

54. Zhongyang junwei bangongting, ed., *Deng Xiaoping guanyu xin shiqi jundui jianshe lunshu xuanbian* [Selection of Deng Xiaoping's expositions on army building in the new period] (Beijing: Bayi chubanshe, 1993), pp. 44–45.

55. On the requirements of deterrence, see Yao, "Chinese Nuclear Policy and the Future of Minimum Deterrence," pp. 114–116.

China's view of deterrence in his memoir, China needed to develop nuclear weapons "in order to have the minimum means of counterattacking (*you qima de huanji shouduan*) when our country sustains an imperialist surprise attack with nuclear weapons."⁵⁶

Mao, Deng, and other Chinese leaders never openly discussed in any detail the operational requirements for China's small force. In 1970, for example, Zhou Enlai stated at a planning meeting of the National Defense Science and Technology Commission that China did not intend to use nuclear weapons to intimidate others and thus did not need many weapons, but nevertheless "[we] must build a certain number of a certain quality and a certain variety."⁵⁷ In 1978, as China was developing the DF-5, its first ICBM, Deng determined China's requirements for the future development of its nuclear force. According to Deng, "Our strategic weapons should be updated (*gengxin*) and the guideline [for their development] is few but capable (*shao er jing*). Few means numbers and capability should increase with each generation."⁵⁸

Over time, China sought enough missiles to survive a first strike so that it could launch a retaliatory strike. As Deng noted, China "did not require large numbers of weapons, [only] the power to be frightening."⁵⁹ Moreover, China's leaders viewed a small force as sufficient for deterrence so long as it could survive a first strike and retaliate. As Deng told Chile's foreign minister in 1978, "We also want to build some nuclear weapons, but we are not preparing to make many. When we have the power (*liliang*) to counterattack (*huanji*), we won't continue to develop them."⁶⁰

Among the first two generations of Chinese leaders, Gen. Zhang Aiping offered, arguably, the most detailed description of China's view of the requirements of deterrence available in primary source documents. In 1981 General Zhang noted,

As for strategic weapons, including the navy's nuclear submarines, our task is to ensure a certain power to strike back (*yiding de huanshou zhi li*). This of course is not in terms of a numerical comparison with the enemy and also not focusing first on precision. Instead, the key point is having nuclear weapons that are complete (*wanshan*) and can be used operationally. We must think of

56. Nie Rongzhen, *Nie Rongzhen huiyilu* [Nie Rongzhen's memoirs] (Beijing: Jiefangjun chubanshe, 1986), p. 814. Interestingly, neither his official collection of military works (*junshi wenxuan*) nor his chronology of activities (*nianpu*) contains any document where he made this statement in an official capacity.

57. Zhou Enlai, *Zhou Enlai wenhua wenxuan* [Zhou Enlai's selected works on cultural affairs] (Beijing: Zhongyang wenxian chubanshe, 1998), p. 661.

58. Zhongyang junwei bangongting, *Deng Xiaoping guanyu xin shiqi jundui jianshe lunshu xuanbian*, p. 99.

59. *Ibid.*

60. Leng and Wang, *Deng Xiaoping nianpu*, p. 404.

ways to strengthen the survivability of these weapons and shorten the preparation time so that when the enemy launches a surprise nuclear attack, the missiles that we do have can be preserved and then be used to carry out a counterattack, "striking after the enemy has struck" (*houfa zhiren*). This requires that the weapons be reliable and that the preparation time be shorter. After these two problems are resolved, we can consider again precision.⁶¹

Zhang's remarks were made just before China had successfully tested and deployed the DF-5 ICBM and while it was in the final stages of developing its first submarine-launched ballistic missile (SLBM), the JL-1. If his speech is viewed as an outline for China's future plans for the development of its nuclear force in the 1980s, when China faced an overwhelming nuclear and conventional Soviet threat, reliability and survivability set China's modernization agenda. Moreover, consistent with Deng's perspective, having the capability to strike back, even with only a few weapons, was viewed as sufficient for deterring an attack against China.

Existing primary source documents lack discussion of Chinese leadership views on why only a few nuclear warheads would be enough to impose unacceptable damage and, thus, deter potential adversaries from attacking China. Nevertheless, the consistency with which China's leaders focused on a small, retaliatory force implies that they perceived the threshold for such damage as low. In 1967 Mao Zedong reportedly told Andrew Malreaux, "When I have six atomic bombs, no one can bomb my cities. . . . The Americans will never use an atom bomb against me."⁶² Deng expanded on this view in 1981, linking deterrence with the size of an opponent's arsenal: "In the future, there may not be just nuclear war. We have [nuclear weapons] because they also have them. We will have more if they have more. Probably everyone will not dare to use them."⁶³ Finally, as Defense Minister Zhang Aiping told his colleagues during a 1986 meeting of the Central Military Commission, "Although few in number and poor in quality compared with others, we still have achieved the power to strike back."⁶⁴

In the post-Deng era, Chinese leaders' beliefs about deterrence did not change substantially. Indeed, perhaps unsurprisingly, the views of Jiang Zemin are remarkably similar to those of his predecessors. In the aftermath of the 1990–91 Gulf War, Jiang noted that China would maintain "a necessary de-

61. Zhang Aiping, *Zhang Aiping junshi wenxuan* [Zhang Aiping's selected works on military affairs] (Beijing: Changzheng chubanshe, 1994), p. 392. General Zhang was defense minister from 1982 to 1988.

62. Richard M. Nixon, *RN: The Memoirs of Richard Nixon* (New York: Grosset and Dunlap, 1978), p. 557.

63. Leng and Wang, *Deng Xiaoping nianpu*, pp. 779–780.

64. Zhang, *Zhang Aiping junshi wenxuan*, p. 575.

terrent capability (*weishe nengli*)," but would focus defense spending on conventional, not nuclear, forces, again implying a preference for a small and survivable nuclear force.⁶⁵ According to an authoritative book on his military thought, Jiang held the same views regarding the sources of deterrence: "China developed strategic nuclear weapons, not to attack but for defense. . . . [I]t is a kind of great deterrent toward nuclear weapons states and makes them not dare to act indiscriminately."⁶⁶ As noted above, in 2002 Jiang highlighted the broader and multifaceted Chinese concept of "strategic deterrence" (*zhanlue weishe*) in which "nuclear weapons [were] the core force."⁶⁷

Domestic and Organizational Constraints

Our second explanation for the gradual evolution of China's nuclear strategy and forces notes how domestic and organizational politics constrained their development. There were three major constraints: a lack of attention and resources within the PLA; a political environment among strategists that constrained such work; and a lack of expertise on nuclear strategy issues throughout China's national security bureaucracy. Taken together, these conditions explain the underspecified and underinstitutionalized nature of China's nuclear strategy and doctrine before the 1990s.

LIMITED INSTITUTIONAL CAPACITY

Following China's first successful nuclear test in 1964, the upheaval of the Cultural Revolution that started in 1966 limited the attention and resources within the PLA devoted to all aspects of military development, including its nuclear doctrine. During this period, the PLA's professional military education institutions and research organizations established in the 1950s, such as the Academy of Military Sciences (AMS) and the Military Affairs Academy (one of the predecessors to the National Defense University), ceased effective operations. According to Song Shilun, a former president of the AMS, "[M]ilitary research was in a state of paralysis" at this time.⁶⁸ Not only did research and

65. Jiang, *Jiang Zemin wenxuan*, Vol. 1, p. 156.

66. Jiang, paraphrased in Shan Xiufa, ed., *Jiang Zemin guofang he jundui jianshe sixiang yanjiu* [Research on Jiang's Zemin's thought on national defense and army building] (Beijing: Junshi kexue chubanshe, 2004), p. 342.

67. Jiang, *Jiang Zemin wenxuan*, Vol. 3, p. 585.

68. Song Shilun, *Song Shilun junshi wenxuan* [Song Shilun's selected works on military affairs] (Beijing: Junshi kexue chubanshe, 2007), pp. 558–559. Song notes that before the start of the Cultural Revolution, the AMS had a staff of 1,000, including 500 research fellows. By 1969 the authorized staff had been reduced by 70 percent, to 300 personnel with the bureaucratic rank of office

writing on strategy within the PLA come to a virtual halt, but a generation of officers received no formal military education on strategy or doctrine. In turn, this created a lack of knowledge and expertise that persisted into the 1980s, a decade after the formal end of the Cultural Revolution in 1976.

In addition, China's nuclear and missile scientists dominated the country's development of nuclear strategy. Although most of this coterie was formally part of the PLA, they were distinct from operational war-fighting units within the Chinese military. China's leading weapons scientists exercised such influence over nuclear strategy by directly interpreting the requirements suggested by Mao's and Deng's ideas and expressing them in China's nuclear and missile procurement plans. The operational arms of the PLA under the General Staff Department had little role in these processes. The Second Artillery, for example, was treated as a technical branch of the PLA tasked with managing China's nuclear forces, not developing strategic concepts or determining force requirements.⁶⁹

The lack of professional military education and the isolation of China's nuclear strategists slowed the development of strategy. According to a 1995 internal military circulation history on the discipline of "military academic research" (*junshi xueshu yanjiu*) from the AMS, the Second Artillery did not establish its first academic studies research office at the headquarters level until 1978.⁷⁰ During this self-described "developmental stage" of strategy research from 1978 to 1980, the Second Artillery held its second and third "operations application research meetings." In these meetings, the Second Artillery as a military unit discussed for the first time issues such as the international strategic situation; U.S. and Soviet nuclear forces; Second Artillery operational guiding principles; principles of operations, battlefield construction, and survivability; and Second Artillery war preparation construction.⁷¹

In the early 1980s, the Second Artillery published its first operations regulations (*tiaoli* and *tiaoling*). In the Chinese military system, these types of documents are critical to formalizing and regularizing operations of every branch of the armed forces; they are similar to operational doctrine in the U.S. military system. According to the AMS history, the Second Artillery began to research "nuclear strategy theory" only in the early 1980s because of the "popularity of

workers (*gongqin ren yuan*). Although the AMS reopened in 1972, it engaged in only limited research before the Third Plenum of the Eleventh Party Congress in 1978.

69. See Lewis and Xue, *China Builds the Bomb*; Lewis and Xue, *China's Strategic Seapower*, pp. 231–242; and John Lewis and Xue Litai, *Imagined Enemies: China Prepares for Uncertain War* (Stanford, Calif.: Stanford University Press, 2006), pp. 173–213.

70. JXYHZ, pp. 358–371.

71. Previously, the PLA conducted limited research on civil defense and conventional operations under a nuclear scenario. See, for example, Ye, *Ye Jianying junshi wenxuan*, pp. 244–251.

strategy study across the military” at that time.⁷² By the mid-1980s, the Second Artillery published, for the first time, a seminal document, *Di'er Paobing Zhanyixue* (The Science of Second Artillery Campaigns), which became “the Second Artillery’s campaign study guide and underwent testing through campaign exercises and was published and issued to the troops.”⁷³ This document was probably the PLA’s first systematic study of the use of nuclear weapons, coming more than twenty years after China’s first nuclear test.

By the late 1980s, as PLA institutions were being rebuilt, China’s thinking about the roles and missions of nuclear weapons became more developed. Unique information about the PLA’s approach to nuclear strategy is contained in the 1987 publication of *Zhanlue Xue* (The Science of Military Strategy).⁷⁴ This book was the PLA’s first comprehensive work on military strategy published after 1949.⁷⁵ Despite the volume’s title, one Chinese military interlocutor has described the book as “an operational text.”⁷⁶ In stark contrast to current PLA planning, the 1987 study examined China’s strategy for a single military contingency: countering a Soviet invasion from the north.

Echoing the views of Mao and Deng about the utility of nuclear weapons, the 1987 *Zhanlue Xue* notes that the primary purpose of nuclear weapons is to deter a nuclear attack against China. The Second Artillery, as a branch of the PLA, was described as having “a type of deterrent and retaliatory capability” to counter “nuclear monopoly, nuclear blackmail, and nuclear threats.”⁷⁷ Consistent with this view, the book describes only one kind of operation for China’s nuclear forces, a “nuclear counterstrike” (*he fanji*). In particular, the 1987 *Zhanlue Xue* states, “According to the guideline (*fangzhen*) of striking after the enemy has struck (*houfa zhiren*), in future nuclear counterattack operations, [the Second Artillery] will implement the counterattack campaign after the enemy’s surprise attack begins.”⁷⁸ The book notes the use of nuclear weapons only in its broader discussion of China’s strategy during the period of “strategic defense,” namely, after an enemy (e.g., the Soviet Union) had launched an invasion against China, which is consistent with the view of nuclear weapons as only a tool of deterrence.

72. JXYHZ, pp. 361–362.

73. *Ibid.*, p. 366.

74. Gao Rui, ed., *Zhanlue xue* [The science of military strategy] (Beijing: Junshi kexue chubanshe, 1987). Two other books with this same title were published in 1999 and 2001. Hereafter this book will be referred to as ZLX.

75. Song, *Song Shilun junshi wenxuan*, p. 352.

76. Interview by M. Taylor Fravel, Beijing, January 2009.

77. ZLX, p. 114.

78. *Ibid.*, p. 115. One passage in the 1987 *Zhanlue Xue* refers to an aspiration for either a launch-on-warning or launch-under-attack capability. See *ibid.*, p. 136.

In addition, the 1987 *Zhanlue Xue* is relatively clear about the role of nuclear weapons. It states that “if the enemy first uses nuclear weapons, we must resolutely implement a counterattack and carry out nuclear retaliation.”⁷⁹ Indeed, the authors quote directly Deng Xiaoping’s 1983 statement, “If they want to destroy us, they themselves will also suffer some retaliation.” The 1987 *Zhanlue Xue* outlines two roles for nuclear weapons consistent with this approach. In peacetime, “the strategic task is to play a deterrent role, restraining the enemy from launching a nuclear war against us.” Likewise, in wartime, China’s weapons would be used to “prevent (*ezhi*) the escalation of a conventional war to nuclear war and prevent the escalation of a nuclear war.”⁸⁰

Furthermore, the 1987 *Zhanlue Xue* for the first time identified a package of doctrinal concepts that continues to guide China’s nuclear strategy. In the book, a sixteen-character phrase captures the “basic guiding thought” (*jiben zhidao sixiang*) for “bringing into play the deterrent and retaliatory uses” of nuclear weapons.⁸¹ The four principles are centralized control (*jizhong zhihui*), strike only after the enemy has struck (*houfa zhiren*), close defense (*yanmi fanghu*), and key point counterstrikes (*zhongdian fanji*).⁸² These concepts are consistent with China’s view of nuclear weapons as tools of deterrence through the threat of assured retaliation and, as such, China sought to make them as reliable and survivable as possible.

Of equal importance, the 1987 *Zhanlue Xue* hints at the requirements for the size and composition of China’s nuclear force. In particular, the book emphasizes the concept of “effectiveness” (*youxiaoxing*). The authors state, for example, that “our nuclear counterstrike must take effectiveness as the foundation” and that China should develop “an effective nuclear counterstrike capability” (*youxiao de he fanji nengli*).⁸³ The study highlights that the main component of effectiveness is survivability, as “operations under nuclear conditions depend first on survivability.”⁸⁴ For China to achieve survivability, the book calls for increasing the number of bases for missile operations as well as the ability for mobile operations “so that the enemy cannot determine our launch sites (*fashe weizhi*).”⁸⁵ Elsewhere in the book, the authors note the importance of warhead miniaturization, penetration, and accuracy as other elements of effectiveness. Perhaps reflecting the small size of China’s arsenal,

79. *Ibid.*, p. 234.

80. *Ibid.*, p. 115.

81. *Ibid.*

82. On the importance of these guiding principles, see Alastair Iain Johnston, “Comments,” prepared for RAND-CNA conference on the PLA, Washington, D.C., December 2002.

83. *ZLX*, p. 116.

84. *Ibid.*, p. 115.

85. *Ibid.*

especially in the early 1980s when *Zhanlue Xue* was drafted, the authors note the role of “appropriately increasing the number of missiles.”⁸⁶

To be sure, *Zhanlue Xue* contains a minimal discussion of China’s actual use of nuclear weapons. This is noteworthy, in part, because the book states that an adversary may use tactical nuclear weapons against China. This omission is also noteworthy because some evidence suggests that China developed low-yield nuclear weapons but did not operationalize this capability.⁸⁷ The book does not maintain a clear distinction between counterforce and counter-value targets common in Western approaches to deterrence. Instead, the purpose of the nuclear counterattack was “to damage greatly enemy troops and weapons as well as economic power, and to shock the enemy’s spirit,” which could involve striking both types of targets.⁸⁸

POLITICAL CONSTRAINTS

A second broad constraint on the development of China’s nuclear strategy and forces was the existence of a closed political environment that suppressed discussion and debate on such issues. On one level, both weapons development and doctrine were treated with intense secrecy for decades. Research on these issues was largely restricted to the military—primarily the defense industrial community (especially the nuclear scientists) and to a lesser extent the military officers who command troops—and none of it was even remotely public.⁸⁹ Even within the PLA, the secrecy requirements among Second Artillery officers were particularly extreme and onerous. For decades, for example, many could not share their specialization with their families.⁹⁰ This organizational

86. *Ibid.*, pp. 116, 234.

87. Charles D. Ferguson, Evan S. Medeiros, and Phillip C. Saunders, “Chinese Tactical Nuclear Weapons,” in Brian Alexander and Alistair Millar, eds., *Tactical Nuclear Weapons: Emergent Threats in an Evolving Security Environment* (London: Brassey’s, 2003), pp. 110–128.

88. ZLX, p. 235.

89. This has been a common and consistent conclusion of all major research on Chinese nuclear issues for decades. See Hsieh, *Communist China’s Strategy in the Nuclear Age*; Lewis and Xue, *China Builds the Bomb*; Xue, “The Evolution of China’s Nuclear Strategy”; Johnston, “China’s New ‘Old Thinking’”; Alastair Iain Johnston, “Prospects for Chinese Nuclear Force Modernization: Limited Deterrence versus Multilateral Arms Control,” *China Quarterly*, No. 146 (June 1996), pp. 548–576; Alastair Iain Johnston, “Some Thoughts on Chinese Nuclear Deterrence,” paper prepared for the Workshop on Chinese Military Doctrine, CNA Corporation, Alexandria, Virginia, February 2, 2000; Evan S. Medeiros, “Evolving Nuclear Doctrine,” in Paul J. Bolt and Albert S. Willner, eds., *China’s Nuclear Future* (Boulder, Colo.: Lynne Rienner, 2006), pp. 39–78; Evan S. Medeiros, “‘Minding the Gap’: Assessing the Trajectory of the PLA’s Second Artillery,” in Roy Kamphausen and Andrew Scobell, eds., *Right Sizing the People’s Liberation Army: Exploring the Contours of China’s Military* (Carlisle, Pa.: Strategic Studies Institute, U.S. Army War College, 2007), pp. 143–190.

90. On this environment in the Second Artillery, see Lewis and Xue, *Imagined Enemies*, pp. 173–182.

culture stifled deliberations within the PLA, as well as broader interagency debate and discussion.

Ideological barriers further hindered the development of China's nuclear strategy and doctrine. The PLA was a CCP-led military with strong adherence to the "military thought" (*junshi sixiang*) of Mao and Deng. As argued in the previous section, leadership beliefs about the narrow utility of nuclear weapons as devices of deterrence and countercoercion were clear and consistent. This created a political environment in which research and debate were bounded: Mao's and Deng's ideas were not questioned. Most research and operational work was focused on further developing these ideas and ensuring they were expressed, over time, in the PLA's operational nuclear planning.⁹¹ This was reflected, as argued above, in the consistent focus in technical modernization plans on improving the survivability and reliability of China's nuclear forces, rather than on building a large and diverse force.

A specific manifestation of the political correctness surrounding nuclear debates in China was an internal deliberation in the 1980s about whether the Chinese government would continue its public position that it "opposed the policy of nuclear deterrence."⁹² This policy was based on the logic that, despite China's decades-long possession of nuclear weapons, Chinese strategists viewed "nuclear deterrence" as negative and as a policy and practice that China should oppose. The origins of this thinking lie in the Chinese translation of the term "deterrence" (*weishe*), which is to use overwhelming military force (*wei*) to intimidate (*she*) an adversary into submission. Based on this rendering of deterrence, Chinese leaders and policymakers viewed deterrence as inherently aggressive Western behavior, akin to coercion or compellence, in which China did not see itself engaging.⁹³ Chinese strategists believed that they were seeking nuclear weapons to break the monopoly of the superpowers and avoid coercion, not to intimidate or coerce others. It is not a coincidence that the word "deterrence" (*weishe*) does not appear once in Mao's selected military works and appears only once in the corpus of documents on Deng's thought.⁹⁴ The outcome of this internal debate was that the term "deterrence" could be used in internal discussions, but that in public statements, China would continue to oppose nuclear deterrence. China did not change its public position to

91. On this point, see Johnston, "Some Thoughts on Chinese Nuclear Deterrence."

92. This internal debate is specifically addressed in *JXYHZ*, pp. 361–363. On the debate and use of the term, see Johnston, "Some Thoughts on Chinese Nuclear Deterrence." Another manifestation of such constraints might be the debate over China's policy of no first use, discussed below.

93. Li, "Zhongguo hezhanlue bianxi."

94. The word did not appear in the PLA's glossary of military terms, the *Junyu*, until 1997.

advocating nuclear deterrence until 1996, following its participation in negotiations on the CTBT and the emergence of a civilian arms control bureaucracy in China.⁹⁵

LIMITED EXPERTISE

A third constraint on the ability of China to develop a nuclear strategy and doctrine was its lack of expertise on nuclear issues and the disconnected nature of existing specialists across the country's national security bureaucracy. Beyond the nuclear scientists in the defense industrial complex, the operational units of the PLA as well as within the civilian national security bureaucracy, including the research institutes attached to the ministry of state security and the ministry of foreign affairs, possessed little knowledge about nuclear issues. To the extent that any of these government actors possessed relevant knowledge, the lack of coordination among different bureaucratic actors prevented the sharing of expertise during the early years of the reform period in the 1980s.⁹⁶ Greater debate among these various bureaucratic actors would have likely strengthened the quality of Chinese expertise on these issues, as it did within the United States and the Soviet Union during the Cold War.⁹⁷

These weaknesses were most evident in the late 1970s and early 1980s as China joined international arms control forums such as the Conference on Disarmament in Geneva and the United Nations First Committee on disarmament affairs. China's participation in these international organizations created a demand for such expertise and simultaneously served as a training ground for officials, within and outside the PLA, on nuclear strategy, arms control, and nonproliferation issues. This participation catalyzed the study of nuclear strategy and arms control research in China. Events in international strategic affairs, such as the initiation of President Ronald Reagan's Strategic Defense Initiative in 1983 and the beginning of Strategic Arms Reduction Treaty and Intermediate-Range Nuclear Forces Treaty negotiations, fostered further interest by Chinese government analysts who sought to evaluate their consequences for China's nuclear security.⁹⁸ China's participation in CTBT ne-

95. On China's CTBT deliberations, see Alastair Iain Johnston, *Social States: China in International Institutions, 1980–2000* (Princeton, N.J.: Princeton University Press, 2008), pp. 99–117.

96. On the lack of expertise on nuclear strategy issues, see Alastair Iain Johnston, "Learning versus Adaptation: Explaining Change in Chinese Arms Control Policy in the 1980s and 1990s," *China Journal*, No. 35 (January 1996), pp. 27–61; and Evan S. Medeiros, *Reluctant Restraint: The Evolution of China's Nonproliferation Policies and Practices, 1980–2004* (Stanford, Calif.: Stanford University Press, 2007), pp. 210–239.

97. Fred Kaplan, *The Wizards of Armageddon* (Stanford, Calif.: Stanford University Press, 1991); and Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War* (Ithaca, N.Y.: Cornell University Press, 2002).

98. On the importance of these events in shaping China's arms control agenda, see Xiandai guoji

gotiations at the Conference on Disarmament, beginning in 1994, was an inflection point for research on nuclear strategy in China; it led to the integration of the community of experts on nuclear strategy across the Chinese government system: the PLA, defense industrial complex, the ministry of foreign affairs, and government-affiliated research institutes. The demand for Chinese responses to negotiating positions and, ultimately, the decision to sign the CTBT required interagency deliberations. These internal deliberations required detailed research on the threats China faced, the adequacy of China's nuclear force, and the resulting willingness to accept the restraints imposed by CTBT membership. Thus, China's participation in the CTBT played a catalytic role in simulating research and interagency deliberations about China's future nuclear posture.⁹⁹

LACK OF MATERIAL RESOURCES?

A possible alternative explanation for the limited development of China's nuclear strategy and force structure is that the country simply lacked the necessary resources to develop both. In other words, China's nuclear arsenal was small and unsophisticated because China lacked the funds and technologies to build a bigger one, not because it was a deliberate decision based on a specific strategy.

Although such constraints might have played a role during the early phase of China's nuclear weapons development, this explanation is incomplete for several reasons. To start, as argued above, Chinese leaders' views were clear that nuclear weapons were tools of deterrence and that only a small retaliatory capability was needed to accomplish this objective. Both Mao and Deng were explicit about this point. Also, the lack of PLA research on the requirements of a credible retaliatory capability vis-à-vis China's nuclear adversaries meant that the military may have assumed, in the 1970s and 1980s, that its small arsenal was sufficient to deter foreign aggression and coercion.

In addition, given China's consistent gross domestic product (GDP) growth and high defense spending in the 1960s and 1970s, China could have built additional nuclear capabilities if it had pursued a different strategy. After relations with the Soviet Union deteriorated, China's official defense spending as a percentage of total government expenditure varied from 14 to 26 percent from

guanxi yanjiu suo, eds., *Guoji caijun douzheng yu Zhongguo (lunwen ji)* [The international disarmament struggle and China] (Beijing: Shijie zhishi chubanshe, 1987). The evolution of this community is detailed in Medeiros, *Reluctant Restraint*.

99. On the importance of international arms control processes on the development of China's nuclear strategists, see Medeiros, *Reluctant Restraint*, pp. 210–239. On Chinese debates about the CTBT, see Johnston, *Social States*, pp. 99–117.

1967 to 1982. Similarly, between 1960 and 1980, defense spending as a percentage of GDP varied from about 4 to 8 percent. Beginning in 1980, official defense spending as a percentage of GDP consistently declined from slightly less than 4 percent to less than 2 percent two decades later.¹⁰⁰ The latter trend was largely a function of China's rapidly increasing GDP as well as reductions in defense spending (as a percentage of total government expenditure) until the mid-1990s.

Given these spending levels, serial production of China's existing warheads, missiles, and gravity bombs would have been possible. In the 1970s and 1980s, the DF-3 MRBM and DF-4 IRBM would have been key candidates for serial production given that all necessary research and development had been completed and units had been deployed. This, however, did not happen.¹⁰¹ Instead, China's arsenal of both types of missiles increased only gradually. China also deployed its first ICBM (the DF-5) in 1981, but had only deployed four of them by 1992.¹⁰² This slow acquisition time line for the DF-5 could have been the result of resource limitations, given the newness, size, and complexity of these systems. Yet, the fact that the DF-5's original target was the United States, which was not seen in the 1980s as a growing nuclear threat to China, could also reasonably explain the slow deployment time line for this system.

Furthermore, China may have limited the deployment of new nuclear weapons systems for reasons other than resource constraints. In response to the release of the *Final Report of the Select Committee on U.S. National Security and Military/Commercial Concerns with the People's Republic of China* (known as the "Cox Commission"), which alleged Chinese theft of U.S. nuclear weapon and missile secrets, the Chinese government stated that China had developed an enhanced radiation weapon by the mid-1980s but did not deploy it.¹⁰³ Also known as the neutron bomb, this low-yield nuclear weapon would likely have been used to disrupt large Soviet tank columns invading from the north. It remains unclear why China chose not to deploy this weapon, but possible explanations could involve concern about the need for delegation of release authority over these weapons once deployed in the field, because the Chinese leadership has long stressed highly centralized control of nuclear weapons.

100. *China Statistical Yearbook* (Beijing: Zhongguo tongji chubanshe, various years).

101. One objection might be that Deng Xiaoping identified defense as the fourth and last modernization effort, and thus China lacked the resources to build a larger force. Although Deng clearly aimed to reduce the size of the PLA, China nevertheless may have sought to build a larger nuclear force with some of these cost savings if it held a different view of deterrence.

102. Lewis and Hua, "China's Ballistic Missile Programs," p. 19.

103. People's Republic of China, "Facts Speak Louder Than Words and Lies Will Collapse by Themselves—Further Refutation of the Cox Report" (Beijing: State Council Information Office, 1999).

Nevertheless, the decision to forgo deployment of the neutron bomb suggests some nonresource-related restraint in modernizing China's nuclear arsenal. This restraint is particularly interesting given the role of tactical nuclear weapons in Soviet military doctrine and their likely use in a potential attack against China, which China recognized at the time.

A final consideration is that as China's economic growth accelerated and defense spending grew in the latter half of the 1990s, the size of China's nuclear arsenal did not grow rapidly and significantly. Instead, it expanded and modernized at a gradual pace, suggesting that strategic planning rather than resource constraints has driven nuclear procurement. We discuss this possibility in the next section.

Breaking from the Past? Nuclear Strategy since the Late 1980s

The past two decades of China's military modernization offer an opportunity to test our argument about the sources of its nuclear strategy. During this period, China's economic growth accelerated, the military's budget substantially and consistently increased, and the PLA assumed new strategic mandates while possessing the institutional capacity to fulfill them. In other words, the constraints that had limited China's nuclear modernization had diminished, if not been removed. Nevertheless, these important changes did not result in major shifts in the content of China's nuclear strategy or its force structure. Instead, continuity with past thinking and force planning has been much greater than divergence from them. To the extent that change has occurred, it has involved further explication of existing ideas and, to a greater degree, a convergence of operational doctrine with nuclear capabilities consistent with the idea of deterrence through assured retaliation. For example, by 2010 China arguably had deployed a credible second-strike capability against all of its nuclear adversaries—its very goal from 1964 onward. The limited evolution in China's nuclear strategy and doctrine is most evident when compared to the breadth of change in both the PLA's conventional doctrine, which was almost entirely revised, and the PLA's conventional forces, which have been substantially expanded and modernized.

DEVELOPMENT OF OPERATIONAL DOCTRINE

In 1993 Jiang Zemin and the Central Military Commission issued new military strategic guidelines (*junshi zhanlue fangzhen*) focused on "winning local wars under modern especially high-technology conditions."¹⁰⁴ This seminal change

104. Jiang, *Jiang zemin wenxuan*, Vol. 1, pp. 278–294.

in China's military strategy led to the PLA-wide process in the Ninth Five-Year Plan of rewriting operational doctrine for each of the services to focus on joint operations. This process was largely complete in 1999 with the issuing of a series of new campaign outlines (*zhanyi gangyao*) and combat regulations (*zuozhan tiaoling*) for each part of the PLA, including the Second Artillery. The publication of these campaign outlines reflected the reconstitution of the PLA's research and educational institutes, which had spent the 1980s and 1990s studying and developing military strategy and doctrine.

As a result of these changes, authoritative PLA publications indicate that by the early 2000s the Second Artillery had completed a "basic system of military theory" for nuclear operations.¹⁰⁵ In particular, the publication of a series of new teaching materials described in detail the PLA's new doctrine for joint operations, including Second Artillery nuclear operations.¹⁰⁶ PLA materials clearly identified and developed, for the first time, the Second Artillery's "nuclear counterstrike campaign" (*he fanji zhanyi*), and it was the only campaign outlined for the Second Artillery's nuclear forces. Consistent with the 1987 version of *Zhanlue Xue*, the newer PLA texts specifically identified *houfa zhiren* (striking after the enemy has struck) as a basic guiding principle for Second Artillery operations. They also affirmed the central role of other concepts mentioned in the 1987 volume, especially *yanmi fanghu* (close defense) and *zhongdian fanji* (key point counterstrikes). The former concept refers to the importance placed on the survivability of China's nuclear forces; under this concept, the requirements of survivability were developed with a focus on mobility and concealment.¹⁰⁷ The latter concept, key point counterstrikes, refers to the means and methods of Second Artillery retaliation.¹⁰⁸ The 1987 volume identified a range of countermilitary and countervalue targets for retaliation. More recent texts and teaching materials also highlight the value of striking

105. "Ershiyi shiji chu erpao junshi lilun fazhan yu chuangxin" [The development and innovation of Second Artillery military theory in the twenty-first century], in National Military Philosophy and Social Science Planning Office, eds., *Ershiyi shiji chu junshi xue xueke jianshe yu chuangxin* [Development and innovation of military science in the twenty-first century] (Beijing: Junshi kexue chubanshe, 2004), pp. 342–348.

106. Key sources include Wang Hongqing and Zhang Xingye, eds., *Zhanyixue* [The science of campaigns] (Beijing: Guofang daxue chubanshe, May 2000); Wang Hongqing and Zhang Xingye, eds., *Zhanyixue Yanjiu* [Research on the science of campaigns] (Beijing: Guofang daxue chubanshe, 1997), pp. 278–286; Xue Xinglin, ed., *Zhanyi lilun xuexi zhinan* [Campaign theory study guide] (Beijing: Guofang daxue chubanshe, 2001); Zhang Yuliang, ed., *Zhanyi xue* [The science of campaigns] (Beijing: Guofang daxue chubanshe, 2006); and Zhao Xijun, ed., *Shezhan: Daodan weishe zonghentan* [Deterrence warfare: A comprehensive discussion of missile deterrence] (Beijing: Guofang daxue chubanshe, 2005).

107. See, for example, Zhang, *Zhanyi Xue*, p. 622.

108. Lu Lihua, ed., *Jundui zhihui xuexi zhinan* [Military command theory study guide] (Beijing: Guofang daxue chubanshe, December 2004), pp. 277–292; and Wang and Zhang, *Zhanyixue*, p. 372.

counterforce targets as well as countermilitary and countervalue ones. These texts develop the view from the 1987 work that nuclear counterstrikes serve primarily to shock an adversary into submission in the hopes of de-escalating a conflict.¹⁰⁹ Analysts who characterize China's strategy as one of minimum deterrence have overlooked this feature of China's strategy and instead focused on its small force structure.¹¹⁰

By the early 2000s, the Chinese government's official statements about nuclear strategy became clearer as well. An initial attempt at articulating a nuclear strategy was made in 2000 in China's second national defense white paper, but it amounted to a restatement of past policies. The most complete explanation to date, in an official document, appeared in the 2006 white paper, which for the first time ever (and some forty years after China first tested a nuclear device) articulated China's official nuclear strategy. It stated that China pursues a "self-defensive nuclear strategy" (*ziwei fangyu he zhanlue*), which is the official government formulation. The two principles that make up this strategy are "counterattack in self-defense" (*ziwei fanji*) and "limited development" of nuclear weapons (*youxian fazhan*). The 2006 white paper noted that China seeks to "maintain a nuclear strategic deterrent" (*baochi he liliang de zhanlue weishe zuoyong*) with a "lean and effective nuclear force" (*jinggan youxiao he liliang*).¹¹¹ The 2008 white paper reiterated that China remains committed to its policy of unconditional no first use and that China will never enter into an arms race with any other country, which are core ideas in the orthodoxy of Chinese nuclear strategy first articulated after China's nuclear test in 1964.¹¹²

The publication in the late 1990s and early 2000s of authoritative PLA teaching texts provides further support for our argument about China's approach to nuclear strategy. In the 2001 edition of *Zhanlue Xue*, strategists from the AMS describe three ideal types of nuclear deterrence: "maximum" (*zuigao*), "mini-

109. A recent textbook classified potential targets into three types: the military (including conventional and nuclear forces), transportation networks, and urban industries. See Kang Zhanke, Li Gen'an, and Li Pengfei, eds., *Junbingzhong zhishi yu yunyong* [Knowledge and application of the military services and arms] (Beijing: Junshi kexue chubanshe, 2004), pp. 139–141.

110. At the same time, the range of targets does not imply a move toward nuclear war fighting. The range of targets is designed to threaten the maximum amount of punishment in retaliation, thereby upholding deterrence.

111. *2006 nian Zhongguo de guofang* [China's national defense in 2006] (Beijing: Guowuyuan xinwen bangongshi, 2006). In the official English translation of the white paper, "*baochi he liliang de zhanlue weishe zuoyong*" is translated as stating that China "maintains a credible nuclear deterrent force."

112. Chinese officials distinguish between Chinese nuclear policy and nuclear strategy. China's no-first-use pledge is considered to be nuclear policy. In general, civilian government officials tend to have a greater say in nuclear policy, whereas the PLA has a greater say in defining nuclear strategy and doctrine. Interviews by authors, Beijing, June 2008; and *2009 nian Zhongguo de guofang* [China's national defense in 2008] (Beijing: Guowuyuan xinwen bangongshi, January 2009).

mum" (*zuidi*), and "moderate intensity" (*zhongdeng qiangdu*).¹¹³ The last type of deterrence is characterized as relying on "'sufficient and effective' nuclear strike force to threaten an opponent by imposing on him an unbearable destruction to a certain extent so as to attain the objective of one's deterrent." This definition—especially the explicit reference to the concepts of sufficiency and effectiveness—strongly resembles PLA descriptions of China's own nuclear strategy and is consistent with the concept of deterrence through assured retaliation.

The discussion of nuclear strategy and operational doctrine in these new Chinese sources is notable for the high degree of consistency with past publications, including explicit references to concepts used in the 1987 version of *Zhanlue Xue*. To the extent that there are differences between the older and newer texts, the more recent PLA materials provide additional detail about the conduct of actual nuclear operations. Moreover, the persistence of past thinking and concepts in current PLA strategy is consistent with our argument about the sustained influence of Mao's and Deng's beliefs about nuclear weapons. The development of operational doctrine for China's nuclear forces continues to reflect the views of China's senior leaders on the limited utility of nuclear weapons.

This consistency in China's approach to nuclear strategy and operational doctrine is surprising for a number of reasons. First, in the 1990s the PLA was liberated from many of the political and technical constraints of the 1970s and 1980s. The PLA had far more expertise and political space to debate sensitive nuclear issues, but no major shifts in nuclear strategy and doctrine took place. Alastair Iain Johnston's work on Chinese debates about adopting a doctrine based on the Chinese concept of "limited deterrence" (*youxian weishe*) indicates that potential changes were discussed, but were also rejected. Although the resolution of this debate highlights the dominant role of the senior civilian leaders and China's top nuclear scientists in shaping nuclear strategy, it also reveals how nuclear strategy might have changed if the PLA and especially the Second Artillery had played a more influential role.¹¹⁴ In addition, beginning in the mid-1990s, the PLA received substantial government resources for overall force modernization, which did not lead to a shift in nuclear strategy and doctrine. Instead, the PLA used these funds for conventional modernization to develop the capability to credibly threaten or use force in a potential conflict over Taiwan. Second, overall PLA doctrine for conventional operations

113. Peng Guangqian and Yao Youzhi, eds., *Zhanlue Xue* [The science of military strategy] (Beijing: Junshi kexue chubanshe, 2001), p. 235.

114. Personal communication with Alastair Iain Johnston, February 2010.

changed radically in the late 1980s and 1990s, as seen in the comparison of the 1987 and 1999 versions of *Zhanlue Xue*. These two publications alone reflect two radically different militaries, in terms of doctrine, organization, and aspirations.¹¹⁵ Despite these radical changes in conventional doctrine, nuclear strategy and operational doctrine did not change appreciably even though that would have been the most likely opportunity for them to do so.

In sum, developments in the past two decades indicate that China seeks the capability to hold at risk enough of an enemy's valued assets—with the threat of unacceptable damage—that adversaries are deterred from using or threatening to use nuclear weapons against it. Thus, China desires a capability for assured retaliation, not the kind of assured destruction capability that characterized U.S. and Soviet approaches. This conclusion should not be mistaken for the claim that China's nuclear strategy is one of minimum deterrence. The latter concept suggests that China adheres to an accepted package of ideas that prescribes the size, composition, and operations of nuclear forces. Even though deterring nuclear aggression remains China's main purpose for possessing nuclear weapons, whether China adheres to such an accepted package is unclear. For example, China is not committed only to countervalue targeting, which is commonly accepted to be an attribute of minimum deterrence. As discussed above, PLA sources indicate that the Second Artillery would target an adversary's forces and related military facilities in a retaliatory strike to degrade the offensive capabilities of an adversary in an effort to end the conflict.¹¹⁶ Likewise, China is not committed to a specific number of weapons, another component of minimum deterrence.

Within the framework of assured retaliation, an explicit assumption is that China can absorb a first strike. This assumption is reflected in China's consistent proclamation that it firmly adheres to a policy of no first use of nuclear weapons and the PLA's use of *houfa zhiren* as a guiding principle for nuclear strategy. China's no-first-use pledge has been the subject of some debate among Western strategists, who rightly question whether this is just rhetorical grandstanding or a real policy constraint.¹¹⁷ Many U.S. strategists are chastened by the U.S. experience during the Cold War in which the Soviet Union publicly articulated a no-first-use commitment (beginning in 1982) despite nuclear planning to the contrary. However, authoritative military writings on the

115. M. Taylor Fravel, "The Evolution of China's Military Strategy: Comparing the 1987 and 1999 Editions of *Zhanlue Xue*," in James Mulvenon and David M. Finkelstein, eds., *The Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the Chinese People's Liberation Army* (Alexandria, Va.: Center for Naval Analyses, 2005), pp. 79–100.

116. Xue, *Zhanyi lilun xuexi zhinan*, pp. 384–393; and Zhao, *Shezhan*.

117. See, for example, Wortzel, *China's Nuclear Forces*.

Second Artillery, including in military-circulation publications, demonstrate that it plans and trains according to the assumption that China will be struck first with nuclear weapons. The 2006 *Zhanyi Xue*, for example, notes that the nuclear counterstrike campaign will occur “only after the enemy implements a nuclear strike against us” and will thus be “implemented under nuclear conditions.”¹¹⁸ This and other PLA publications strongly suggest that China’s no-first-use pledge is a genuine operational constraint on Second Artillery nuclear operations.¹¹⁹

In the last few years, however, a debate in PLA circles about whether to discard or place conditions on China’s commitment to no first use has raised further questions about China’s commitment to this policy. Chinese officials grudgingly acknowledge this debate but highlight that it concluded with continued adherence to this policy. Whether intended or not, the existence of such a debate generates increased ambiguity about the conditions under which China might use nuclear weapons, thereby strengthening China’s deterrent. An important issue for international analysts to explore is what constitutes first use for China.¹²⁰ It remains unclear whether China would need to be attacked with a nuclear weapon to retaliate in kind. China’s debate about the continued viability of its no-first-use pledge was prompted by concerns that an adversary could use high-powered and very accurate conventional missile strikes to degrade China’s nuclear arsenal without crossing the nuclear threshold.¹²¹ Some Chinese sources indicate that credible early warning of a pending attack would be sufficient to prompt a nuclear response. Other Chinese sources indicate that high-powered conventional attacks on Chinese nuclear forces or attacks that generate weapons of mass destruction-like effects (e.g., destroying the Three Gorges Dam) could prompt a nuclear response from China.¹²²

118. Zhang, *Zhanyi Xue*, p. 619.

119. Li Tilin, “Dui di’er paobing xinxihua jianshe de sikao” [Thoughts on the development of Second Artillery informatization], *Junshi Xueshu*, December 2004, p. 55; Zhang Peimin, “Ruhe fazhan zhanlue weishe shouduan” [How to develop strategic deterrence methods], *Junshi Xueshu*, February 2004, pp. 33–34; Liu Zhenwu, “Lun guojia anquan yu jiji fangyu zhanlue” [A discussion of the national security strategy and active defense], *Junshi Xueshu*, April 2004, p. 8; Dai Siping and Gong Yunchang, “Guanyu he zhanzheng wenti de jidian sikao” [A few thoughts on the issue of nuclear warfare], *Junshi Xueshu*, January 2003, pp. 15–19; and Dai Siping, “Daodan budui de shengzai yu fangyu” [The survivability and protection of missile forces], *Junshi Xueshu*, February 2003, pp. 67–68.

120. Johnston, “Some Thoughts on Chinese Nuclear Deterrence.”

121. Peng Guangqian and Rong Yu, “Nuclear No-First-Use Revisited,” *China Security*, Vol. 5, No. 1 (Winter 2009), pp. 82–85. See also Medeiros, “Minding the Gap,” pp. 146–159.

122. Guo Shunyuan and Wang Heng, “Zhanyi Zhong de Di’er Pao Zuozhan Zhihui Juece” [Second Artillery command and control decisionmaking during a joint campaign], *Junshi Xueshu*, July 2004, p. 65; Shang Yi, “Zhu Chenghu: Foreign News Agency ‘Cites Out of Context,’” *Ta Kung Pao*, July 17, 2005, from World News Connection; and Xue, *Zhanyi Lilun Xuexi Zhinan*, p. 398.

QUALITY OVER QUANTITY IN FORCE MODERNIZATION

Trends in China's force modernization efforts over the past decade provide additional support for our argument. In particular, China has remained focused on developing a secure second-strike capability by improving the reliability, survivability, and penetrability of its nuclear arsenal. Although the PLA has further developed its nuclear strategy and operational doctrine and expanded and upgraded its force structure, both efforts have remained focused on the twin goals of bolstering deterrence and countering coercion.¹²³ In other words, the pace and scope of nuclear modernization is consistent with long-standing Chinese leadership beliefs about pursuing deterrence through assured retaliation.

Even as the financial resources allocated to China's armed forces have increased rapidly over the past two decades, nuclear modernization has been gradual and measured. In 2009 estimates of China's arsenal of deployed nuclear warheads ranged from 121 to 160, with the high-end estimate including as many as 40 ICBMs.¹²⁴ According to a study by the U.S. Air Force's National Air and Space Intelligence Center, "[China's] future ICBMs probably will include some with multiple independently-targeted reentry vehicles, and the number of ICBM nuclear warheads capable of reaching the United States could expand to well over 100 within the next 15 years."¹²⁵ Although this reflects a substantial increase from only 20 in the early 1990s, there is little evidence that China has plans to expand significantly the size of its nuclear arsenal, such as to levels of more than 500 warheads. Two motivations are driving China's efforts to increase the size its force. First, the PLA has sought to update many of its aging systems, which are based on missile technology developed in the 1960s and 1970s. Second, the PLA wants to possess an arsenal large enough to penetrate missile defense systems following a first strike on China. For China, its nuclear forces are strongly linked to its assessment of the size and effectiveness of U.S. strategic defenses.¹²⁶

The second trend in China's nuclear force modernization is a comprehensive

123. For a recent and unique account from Second Artillery leaders, see Jing and Peng, "Huiguoguo di'er paobing zai gaige kafang zhong jiakuai jianshe fazhan de guanghui licheng." For recent Western assessments of Chinese doctrine, see Medeiros, "Minding the Gap"; and Chase, Erickson, and Yeaw, "Chinese Theater and Strategic Missile Force Modernization and Its Implications for the United States."

124. Norris and Kristensen, "Chinese Nuclear Forces." The high-end estimate comes from the Office of the Secretary of Defense, *Military Power of the People's Republic of China, 2009* (Washington, D.C.: U.S. Department of Defense, 2009), p. 66. Uncertainty surrounds the number of DF-31 and DF-31A ICBMs that have been deployed as well as the number of DF-21 MRBMs armed with nuclear warheads.

125. National Air and Space Intelligence Center, *Ballistic and Cruise Missile Threat*, NASIC-1031-0985-09 (Dayton, Ohio: Wright-Patterson Air Force Base, April 2009), p. 3.

126. Yao, "Chinese Nuclear Policy and the Future of Minimum Deterrence," pp. 119–123.

effort to improve the missiles' reliability, survivability, and penetrability necessary for a secure second-strike capability. China seeks to eventually replace all its liquid-fueled missiles with solid-fueled ones. Solid-fueled missiles increase reliability by eliminating the dangerous process of fueling rockets before launch and enhance survivability in case a fuel-storage area for missiles is destroyed in either a conventional or nuclear attack. China has also focused on increasing mobility, another component viewed as key to improving survivability. On land, China has developed two new classes of road-mobile ICBMs, the DF-31 and DF-31A, which it started to deploy in 2008. The development of these systems marks China's possession of a truly road-mobile nuclear-strike capability—a goal that PLA leaders identified as far back as the 1970s. Conducting such mobile missile patrols is a new and significant operational challenge for the Second Artillery, and the results of its experiences remain unclear. In addition, China is building as many as five Jin-class SSBNs, which would be armed with ten to twelve JL-2 SLBMs. When these missiles become operational, the deployment of the Jin-class vessel will provide a real sea-based leg to China's nuclear arsenal. China's SSBNs and the JL-2s would not likely be controlled by the Second Artillery but by the PLA Navy (PLAN). The degree of coordination between the PLAN and the Second Artillery remains unclear. Interestingly, China's 2008 National Defense White Paper publicly mentioned for the first time the PLAN's role in nuclear deterrence missions.¹²⁷

The gradual pace of China's nuclear procurement over the past two decades contrasts starkly with the rapid expansion of China's conventional missile force. With only a few hundred short- and medium-range conventionally armed ballistic missiles in the mid-to-late 1990s, the PLA today may possess as many as 1,500 short- and medium-range conventionally armed ballistic and cruise missiles, many of which are highly accurate and possess increasingly destructive power.¹²⁸ Since the mid-1990s, the PLA's efforts to develop the capability to deter and possibly invade Taiwan have emphasized improving China's conventional military forces, including its conventional missile force. At the same time, China has not sought to compensate for its conventional inferiority against U.S. forces by developing a range of low-yield nuclear weapons. Rather, the PLA has sought to gradually improve its strategic deterrent while developing a diverse range of conventional strike capabilities in support of anti-access/area-denial operations in a Taiwan conflict.

127. According to the white paper, "The submarine force possesses . . . some nuclear counterattack capabilities." On the PLA's role in nuclear counterattack missions, see Lu, *Jundui zhihui xuexi zhinan*, pp. 241–242.

128. Office of the Secretary of Defense, *Military Power of the People's Republic of China, 2008* (Washington, D.C.: U.S. Department of Defense, 2008), p. 22.

The Future Direction of China's Nuclear Posture

The puzzle addressed in this article and our explanations of it raise the obvious follow-on question: How will China's nuclear strategy and forces evolve in the future? Will they continue on their current trajectories or assume new ones? And what are the factors that will influence either possibility? In general, the drivers of China's future nuclear strategy have two main attributes: they are principally linked to advances in U.S. military capabilities (as opposed to those of other nations) and to U.S. strategic defenses and conventional strike capabilities in addition to the United States' nuclear forces. More specifically, the PLA's main concerns about maintaining a credible second-strike force are driven by the U.S. military's development of a trifecta of nonnuclear strategic capabilities: (1) missile defenses, (2) long-range conventional strike, and (3) sophisticated command, control, communications, computers, intelligence, surveillance, and reconnaissance (C⁴ISR) assets to locate and target China's nuclear forces. The combination of these three capabilities, in the eyes of the Chinese, provides the United States with the ability to eliminate China's deterrent in a crisis without crossing the nuclear threshold, reopening the door to U.S. coercion of China. The PLA fears that the United States could use its C⁴ISR assets to locate Chinese nuclear forces and destroy most of them with long-range conventional strikes. U.S. missile defenses would then allow the United States to "catch" China's ragged retaliation.¹²⁹ It is this scenario that motivated the debate about the viability of China's no-first-use pledge, and it is now motivating multiple dimensions of nuclear and missile procurement addressed above.

As China's nuclear strategy and forces evolve, an important consideration is that the Second Artillery does not determine either one. Instead, it represents only one of a growing number of voices in internal discussions on nuclear issues. Moreover, the influence of the Second Artillery in these debates, including those related to the size of China's nuclear forces, is unclear. For decades, nuclear strategy and doctrine in China has been the purview of the weapons scientists who developed China's nuclear and missile capabilities by dint of their positions both within the PLA as well as within China's military research

129. For a recent articulation of this concern, see Peng and Rong, "Nuclear No-First-Use Revisited," pp. 82–85; and Yao, "Chinese Nuclear Policy and the Future of Minimum Deterrence," pp. 119–120. Additional PLA assessments include Zhao, *Shezhan*; Li, "Dui di'er paobing xinxihua jianshe de sikao," p. 55; Dai and Gong, "Guanyu he zhanzheng wenti de jidian sikao"; Dai, "Daodan budui de shengzai yu fangyu"; and Liu Bin and Jiang Wenjie, "Zhongguo he zhanlue: dang bian ze bian" [China's nuclear strategy: Adapting to change], *Nanfang Zhoumo*, June 18, 2009, <http://www.nanfangdaily.com.cn/epaper/nfzm/content/20090618/ArticleB11002FM.htm>.

and development complex.¹³⁰ Based on Mao's and Deng's views on the limited utility of nuclear weapons, these military scientists made recommendations about the capabilities China should pursue. In the last ten to fifteen years, this appears to have changed, a bit. The PLA has begun to play a larger role in internal discussions about China's nuclear strategy by virtue of several factors: its accumulated expertise on military doctrine, its successful renovation of overall PLA doctrine, its greater role in defense procurement (following key reforms in the late 1990s), its greater professionalization, and a changed political environment that has allowed discussion of such sensitive topics. As a result, the PLA increasingly has a voice in such issues. The Second Artillery, however, is one voice within a broader collection of PLA strategists and operators, including those in the General Staff Department and in the General Armaments Department (responsible for procurement for the entire PLA). So, the Second Artillery likely may advance recommendations about changes in doctrine and capabilities (including changes in capabilities that have a direct impact on doctrine), but these issues are ultimately decided at the national level of the civilian leadership, in which actors outside of the PLA have a strong voice, including the scientific establishment, civilian experts, and the ministry of foreign affairs. Even though more debate is likely, the increased number of actors involved in decisions about China's overall nuclear posture creates an additional barrier to building a consensus around a rapid and significant shift from its current strategy and force structure.

Looking forward, this situation suggests that two aspects of modernization should be monitored, as they might signal a change in China's nuclear posture. First, in response to missile defense programs in the United States and other countries, the Second Artillery is researching and developing a variety of technologies to defeat such systems, including maneuvering reentry vehicles (MaRVs), multiple independently targeted reentry vehicles (MIRVs), decoys, chaff, jamming, thermal shielding, and ASAT weapons.¹³¹ If deployed, MaRV and MIRV warheads could affect China's strategic relationships with other nuclear powers by increasing the options available to China for using its nuclear weapons, including providing it with additional options against smaller nuclear powers such as India. This shift could undermine strategic stability in China's relationships with India and Russia because MIRV'd missiles, in particular, have a first-strike potential. Arming the silo-based missiles such as the DF-5 with MIRV'd warheads might also further undermine crisis stability by

130. The role of this community is detailed in Lewis and Xue, *China Builds the Bomb*.

131. Office of the Secretary of Defense, *Military Power of the People's Republic of China*, 2008, p. 24.

presenting a potentially vulnerable target for an opponent's first strike against China.¹³²

Second, another aspect to monitor is whether China's new MRBMs, IRBMs, and land-attack and air-launched cruise missiles will be armed with nuclear warheads. To date, these systems appear to have conventional missions. If these new systems assumed nuclear roles, beyond just replacing the aging DF-21, DF-3A and DF-4 systems, this could indicate an important shift in China's approach to nuclear weapons. Such developments could indicate, for example, that China seeks to develop a more flexible nuclear posture to deter a broader range of threats across a wider set of contingencies. This could lead to a greater willingness to countenance using nuclear weapons for discrete military purposes, moving China down the slippery slope of nuclear war-fighting strategies and away from a strict emphasis on assured retaliation. These are important areas of PLA operational doctrine and weapons procurement to monitor.

Conclusion

This article began with a simple puzzle: Why was China willing to accept such a high degree of vulnerability of its nuclear arsenal for more than four decades? Structural realism and the practices of other nuclear-armed states might have predicted that China would develop a larger and more diverse nuclear force and a more detailed strategy for using it. Instead, China gradually built a modest-sized arsenal and articulated a basic nuclear strategy that stressed development of a secure second-strike capability for achieving deterrence through assured retaliation, including an arsenal large enough to overcome a potential adversary's strategic defenses.

To explain this puzzle, we advanced two explanations. First, China's top leaders and military strategists held simple views about the role and missions of nuclear weapons: to deter nuclear aggression, to prevent coercion by other nuclear armed states, and to confer a diffuse sense of great power status on China. Perhaps more important, they embraced the idea of deterrence through assured retaliation and believed that a small number of survivable weapons was sufficient to accomplish these goals, with these conditions left up to technical experts to interpret. These simple ideas provided a consistent and persistent strategic logic that drove only a very gradual development of strategy and forces. Second, for decades, China's military lacked expertise on nuclear strat-

132. Chase, Erickson, and Yeaw, "Chinese Theater and Strategic Missile Force Modernization and Its Implications for the United States."

egy and devoted little attention to it, leading to an underspecified strategy and underdeveloped operational doctrine. China's political culture created an environment in which Mao's and Deng's beliefs predominated, especially in a CCP-controlled military with a tradition of land-based conventional warfare. Over time, this situation evolved as expertise and attention to nuclear issues grew and as external events required China's response. This change led China to examine, systematically, the requirements of a credible second-strike capability, which it appears to have achieved.

Although more than two decades of military modernization have removed many financial and technical constraints, China has not substantially changed its nuclear strategy or its force structure. Instead, efforts to draft operational doctrine and improve China's nuclear deterrent reflect a continuing maturation in Chinese thinking about the nuclear threats facing China and the necessary strategy, doctrine, and force structure to address these challenges. Chinese writings and the associated changes in China's nuclear force structure suggest a continued adherence by China's top leaders to Mao's and Deng's traditional views on nuclear strategy and the primacy of assured retaliation. China is adapting to new circumstances but in ways that remain within the bounds of the long-standing view that the sole purpose of nuclear weapons is to deter nuclear aggression and prevent coercion. Assured retaliation, not minimum deterrence, best characterizes China's approach to its nuclear strategy.

Looking to the future, Chinese strategists view advanced U.S. offensive and defense capabilities as threatening the viability of China's nuclear deterrent. Many in China argue that the trinity of conventional strategic strike, missile defenses, and sophisticated C⁴ISR platforms has the capability to substantially hold at risk, if not eliminate, China's nuclear arsenal, leaving it open to coercion by the United States. Yet, to date, China's response has not been to alter radically its nuclear doctrine or force structure. Rather, China has injected a degree of ambiguity into its doctrine to improve its ability to deter conventional threats to its nuclear weapons assets. Regarding force structure, China so far has avoided massive increases in size and instead has sought to improve survivability through mobility, enhanced concealment, and some increases in force size. China is also developing a variety of technical means to defeat missile defenses, including decoys, penetration aids, and possibly multiple warheads. This mix of responses suggests that China continues to view nuclear weapons as possessing a narrow utility. To the extent that Chinese nuclear strategy has changed, it now envisions credible deterrence as resting on three pillars: survivability, reliability, and penetrability, with the first pillar based less on just ambiguity about the size and location of China's nuclear forces and more on their mobility and concealment. Nevertheless, the goal

remains the same, namely, a secure second-strike capability for deterrence through assured retaliation.

To use the language of Hans Morgenthau, one might characterize China's emphasis on developing only a small, credible arsenal as a "prudent" foreign policy. Chinese leaders have believed that nuclear weapons were basically unusable on the battlefield and that once mutual deterrence was achieved, a larger arsenal or arms racing would be costly, counterproductive, and ultimately self-defeating. Likewise, China's leaders have never equated the size of their arsenal with China's national power. Instead, to be seen as powerful and to deter attacks against it, China needs only a small number of nuclear weapons.