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Certainty of Uncertainty: Nuclear Strategy with Chinese Characteristics

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ABSTRACT China's nuclear deterrent relies on so-called 'first strike uncertainty', which means not letting the other side be confident of a completely successful disarming strike. But in order to deter, the uncertainty must be high enough. After reviewing the developmental history of China's nuclear capability and the evolution of Chinese and foreign leaders' perceptions of China's nuclear retaliatory capability, this article identifies the criteria of nuclear deterrence for China and other countries. This research can contribute to Sino-US strategic dialogue and deepening understanding of the security consequences of nuclear proliferation.

KEY WORDS: China, First Strike Uncertainty, Nuclear Strategy

Introduction

China's nuclear posture is special among the five Nuclear Nonproliferation Treaty (NPT) nuclear-weapon states for the following reasons: China keeps a very small nuclear arsenal; Chinese nuclear weapons are kept de-alerted in peacetime; and China maintains an unconditional no-first-use policy. It is commonly held in Western academia that China's nuclear strategy is similar to 'minimum deterrence'. Yet scholars use varied terminology. Bates Gill has been among those arguing that China's nuclear posture is shifting from minimum deterrence to credible minimum deterrence.[1] Jeffrey Lewis has contended that China's nuclear arsenal and arms control

[1]Bates Gill, James C. Mulvenon and Mark Stokes, 'The Chinese Second Artillery Corps: Transition to Credible Deterrence', in James C. Mulvenon and Andrew N.D. Yang (eds), *The People's Liberation Army as Organization* (Santa Monica, CA: RAND 2002), 510–86.

policy reflect a belief that 'deterrence is relatively insensitive to changes in the size, configuration, and readiness of nuclear forces'. As such, the purpose of China's nuclear weapons has been to gain 'minimum means of reprisal'.[2] Taylor Fravel and Evan Medeiros have argued that China's nuclear strategy is 'assured retaliation', which is different from minimum deterrence.[3] John Lewis and Xue Litai believe that the best description of China's nuclear strategy should be 'limited nuclear retaliation'.[4] Li Bin has argued that China's nuclear strategy is anti-coercion rather than nuclear deterrence.[5] General Yao Yunzhu has described China's nuclear strategy in Western terms: strategic deterrence rather than operational and tactical utility; retaliatory rather than denial deterrence; central rather than extended deterrence; general rather than immediate deterrence; defensive rather than offensive deterrence; minimum rather than limited or maximum deterrence.[6]

A question remains unanswered by all of this research. Given US nuclear superiority over China and the low survivability of Chinese nuclear weapons, China has no retaliatory capability according to the strategic analysis approach applied to US–Soviet relations during the Cold War. As a result, what is the source of China's nuclear deterrence? There are two answers to this question. The first is that China has no nuclear deterrence at all. Keir Lieber and Daryl Press have argued that the United States has disarming capability against China, and could transform this capability into coercive power.[7] The second, as argued by Avery Goldstein, is that although China's nuclear forces are weak, it still can create 'first strike uncertainty' in the mind of the opposing side's leaders to deter potential nuclear attack against China.[8] These two answers represent two extreme points. Lieber and Press

[2]Jeffrey G. Lewis, *The Minimum Means of Reprisal: China's Search for Security in the Nuclear Age* (Cambridge, MA: MIT Press 2007), 20.

[3]M. Taylor Fravel and Evan S. Medeiros, 'China's Search for Assured Retaliation: The Evolution of Chinese Nuclear Strategy and Force Structure', *International Security* 35/2 (Fall 2010), 48–87.

[4]John Lewis and Xue Litai, 'Zhongguo Junshi Zhanlue Fangzhen ji Hezhanlue zhi Yanbian' [Evolution of China's Military Strategy Guidance and Nuclear Strategy], *Lingdaozhe* 38 (Feb. 2011), 18–30.

[5]Li Bin, 'China's Potential to Contribute to Multilateral Nuclear Disarmament', *Arms Control Today* (March 2011), <http://www.armscontrol.org/act/2011_03/LiBin>.

[6]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), 111–24.

[7]Keir A. Lieber and Daryl G. Press, 'The End of MAD? The Nuclear Dimension of US Primacy', *International Security* 30/4 (Spring 2006), 7–44.

[8]Avery Goldstein, *Deterrence and Security in the 21st Century: China, Britain, France, and the Enduring Legacy of the Nuclear Revolution* (Stanford UP 2000), 111–38.

neglect all uncertainties, assuming unreasonably that the United States has perfect intelligence capability. In contrast, Goldstein's belief that uncertainty can deter is too optimistic. While the contribution of uncertainty to deterrence makes sense, it might be too low to deter. In order to deter, uncertainty would have to be adequate. This leads to another question, namely what is the threshold of first strike uncertainty to deter? This article will address this question.

The basic question this article asks is: 'how *uncertain* is enough?' as opposed to the classical question in the Cold War: 'how much is enough?' First strike uncertainty gradually increases with China's modernizing effort, from just above zero (after first nuclear test) toward 100 per cent (so-called assured retaliation). The threshold therefore must be somewhere between zero and 100 per cent, above which China would be conceived as having nuclear retaliatory capability. But given the complexity of this issue, we do not expect to figure out an exact probability number. In this article, we will review the developmental history of China's nuclear capability and the evolution of Chinese and foreign leaders' perceptions of China's nuclear retaliatory capability, then the perceptional turning points will be identified, which represent Chinese and foreign leaders' thresholds (criteria).

Specifically, this article will try to answer these questions: do Chinese leaders believe that China's nuclear retaliation could be assured? Did China begin to believe that it had nuclear deterrent capability after its first nuclear test? If not, when? What are China's criteria for nuclear deterrence? Did China's potential adversaries begin to believe that it had nuclear deterrent capability after China's first nuclear test? If not, when? What are their criteria? Do China and its potential adversaries have the same criteria? If not, why?

This article argues that once China's nuclear weapons gained delivery capability and a degree of survivability through mobility and concealment, China's adversaries would believe that China had nuclear retaliatory capability. It should be noted that from the perspective of China's adversaries, the operability of Chinese nuclear forces is not a part of the criteria. Usually it is difficult to acquire such intelligence; therefore they probably adopt the worst-case assumption that once a missile is deployed, it is operational. But it can be concluded from Chinese nuclear history that it takes a nascent nuclear force many years to acquire independent launch capability. Therefore from China's perspective, in addition to delivery capability, mobility and concealment, the criteria of nuclear deterrence also include an independent launch capability.

This research will contribute to Sino-US strategic dialogue. China's nuclear philosophy and posture are too special to be well understood by US government, military and academia. This fact has led to confusion

and discord in strategic dialogue.[9] This article could help to deepen the understanding of China's nuclear posture and philosophy. China's view about nuclear deterrence and the role of nuclear weapons is different from that of the US-Soviet experience during the Cold War, we need a new theoretical model to describe Sino-US nuclear relations. Identifying China's criterion for nuclear deterrence, this article provides a framework for building Sino-US strategic stability.

This article could also contribute to the debate about the security consequences of nuclear proliferation. Proliferation optimists argue that the effect of nuclear proliferation is stabilizing, because the mutual deterrent logic applied to the two superpowers during the Cold War could also apply to all nuclear-armed states, and even a small and not-well-developed nuclear arsenal could deter adversaries from attacking the proliferator.[10] Proliferation pessimists, by contrast, contend that nuclear proliferation is destabilizing, since more nuclear weapons in more states might result in preventive wars and nuclear accidents.[11] Lyle Goldstein explores the 1969 Sino-Soviet conflict, concluding that an asymmetric force structure is unstable, and the strong side faces the temptation to launch a preventive war to get rid of the threat from the new proliferator.[12] This article reviews China's nuclear history, identifying the threshold beyond which an asymmetric force structure would become stable, with the hope of deepening the understanding of the interactions between states with asymmetric forces.

The structure of this article is as follows. The next section will be devoted to the general discuss of first strike uncertainty. Then the role of uncertainty in the Chinese nuclear posture will be discussed. After that, the author will review the history of Chinese nuclear weapons and the evolution of the first strike uncertainty. In the final section, the evolution of Chinese and foreign leaders' perceptions of China's nuclear retaliatory capability is reviewed, and the thresholds of nuclear deterrence for China and other countries identified.

[9]Gregory Kulacki, 'Chickens Talking With Ducks: The US-Chinese Nuclear Dialogue', *Arms Control Today* (Oct. 2011), <www.armscontrol.org/act/2011_10/U.S._Chinese_Nuclear_Dialogue>.

[10]Kenneth N. Waltz, *The Spread of Nuclear Weapons: More may be Better*, Adelphi Paper No. 171 (London: IISS 1981).

[11]Scott Sagan, *The Limits of Safety: Organizations, Accidents, and Nuclear Weapons* (Princeton UP 1993).

[12]Lyle J. Goldstein, 'Do Nascent WMD Arsenals Deter? The Sino-Soviet Crisis of 1969', *Political Science Quarterly* 118/1 (Spring 2003), 53–80.

Logic of Uncertainty

Uncertainty is an important attribute of war.[13] While it might be reduced through intelligence, it is impossible to eliminate. In the nuclear age, uncertainty has become even more important. As stated within the 'Healey Theorem', originated by former UK Defence Secretary Denis Healey, 'it takes only 5 per cent credibility of American retaliation to deter the Russians, but 95 per cent credibility to reassure the Europeans'.[14] McGeorge Bundy has also argued 'they [thermonuclear weapons] make it necessary to achieve a kill rate very near 100 per cent. Anything less is not good enough for safety – only good enough, at best, for deterrence.'[15]

Devin Hagerty first put forward the concept of 'first strike uncertainty' in dealing with the strategic stability in South Asia. '[A]ll that is necessary to deter the launching of a preemptive strike is "first strike uncertainty", or the planting of a seed of doubt in the minds of the potential attacker's leaders about whether it is possible to destroy all of the victim's nuclear weapons before it can retaliate.'[16] In other words, 'first strike uncertainty' means the probability that the attacker, which launched a first strike, will receive the victim's nuclear retaliation. The idea was also used in analyzing Sino-Soviet relations, although without referring to the term explicitly. Gregory Treverton believed that 'Moscow must reckon that no matter what first-strike it launched against China, some Chinese missiles launched in a retaliatory strike would reach Soviet targets.'[17]

First strike uncertainty is always connected with the concept of 'existential deterrence', which was invented by McGeorge Bundy in analyzing US–Soviet strategic relations. His assumption was that the nuclear forces of the opposing sides were survivable: 'As long as each side retains survivable strength so that no leader can ever suppose that he could "disarm" his opponent completely, nuclear war remains an overwhelmingly unattractive proposition for both sides.'[18] Marc

[13]Carl von Clausewitz, *On War* (translated by J.J. Graham) (Wilder Publications 2008), 44.

[14]Denis Healey, *The Time of My Life* (London: Penguin Books 1989), 243. The author thanks David Holloway for providing this reference.

[15]McGeorge Bundy, 'The Bishops and the Bomb', *New York Review of Books* (16 June 1983).

[16]Devin T. Hagerty, 'Nuclear Deterrence in South Asia: The 1990 Indo-Pakistani Crisis', *International Security* 20/3 (Winter 1995–96), 79–114.

[17]Gregory Treverton, 'China's nuclear forces and the stability of Soviet-American deterrence', in *The Future of Strategic Deterrence Part I*, Adelphi Papers 160 (London: IISS 1980), 38–44.

[18]Bundy, 'The Bishops and the Bomb'.

Trachtenberg reduced the criterion for existential deterrence to 'the mere existence of nuclear forces'. He contended, '[W]hatever we say or do, there is a certain irreducible risk that an armed conflict might escalate into a nuclear war. The fear of escalation is thus factored into political calculations: faced with this risk, states are more cautious and more prudent than they would otherwise be.'[19]

In order to define 'uncertain retaliation', we need to explore 'assured retaliation' first. Assured retaliation means that even under an extremely worst-case scenario (bolt-from-the-blue nuclear attack, no early warning at all, regular alert status), after absorbing a first strike, some nuclear weapons would survive and be used for retaliation. In theory, there are four approaches to achieve assured retaliation. The first is to build a large number of nuclear weapons. In this mode, the survivability of single nuclear weapons is not important. The second is to build very quiet SSBNs (nuclear propelled ballistic-missile firing submarines), keeping at least one patrolling undersea at all times. The third engages launch-on-warning silo-based missiles, which are kept on alert in peacetime.[20] This mode is dangerous because of the risk of false alarm. The fourth approach engages land-based mobile missiles, keeping moving randomly. In practice, this mode is very hard to realize. If a country's nuclear arsenal and nuclear posture could not meet any of these requirements mentioned above, it could only achieve uncertain rather than assured retaliation.

Sources of first strike uncertainty include the following. First and foremost, the offensive side might be unable to know the exact number and location of the defensive side's nuclear weapons. This could be achieved through such measures as secrecy regarding the location of nuclear weapons. Second, the offensive side might be prevented from destruction of nuclear weapons due to their nature of deployment. For example, nuclear weapons could be stored in underground facilities, and missiles could also be deliberately deployed at the 'wrong' side of a mountain or between two mountains, so that the geographical location could obstruct a direct hit.[21]

Concealment is the primary measure to induce first strike uncertainty. The effects of concealment are both concrete and psychological. On one hand, concealment could render one's adversary unable to find one's nuclear weapons, increasing survivability. On the other hand,

[19]Marc Trachtenberg, 'The Influence of Nuclear Weapons in the Cuban Missile Crisis', *International Security* 10/1 (Spring 1985), 137–63.

[20]The author thanks an anonymous reviewer for pointing this out.

[21]Hans M. Kristensen, Robert S. Norris and Matthew G. McKinzie, *Chinese Nuclear Forces and US Nuclear War Planning* (Washington DC: Federation of American Scientists & Natural Resources Defense Council Nov. 2006), 186.

concealment could create uncertainty in the mind of the opposing side's leaders. This lack of confidence would indicate that even though the concealment measure itself is not perfect, it remains a means of deterrence. A frequently mentioned case of successful concealment is that during the 1991 Gulf War, while the allies conducted 1,460 strikes against Iraqi Scud missiles, there was no evidence demonstrating that any Scud Transporter-Erector-Launcher (TEL) was destroyed.[22]

Besides concealment, another important measure creating uncertainty is mobility. As mentioned above, mobile missiles, if kept moving randomly, could realize assured retaliation. But in reality, especially for the weak side in an asymmetric system, mobile missiles are usually kept in garrisons in peacetime and only sent out during crisis or for training purposes. This deploying mode cannot realize assured retaliation, because the garrisons might be found and destroyed in a bolt-from-the-blue attack. Sometimes the mobile missiles are stored in hardened underground facilities, but these facilities could be destroyed by nuclear or conventional bunker-busters, and the opposing side could also attack the vulnerable entrances and trap the missiles inside.

There are two ways for first strike uncertainty to contribute to strategic stability. First, given nuclear weapons' massive destructive capability, if one is not confident of destroying all his adversary's nuclear weapons, it is very difficult for him to make a decision to launch a first strike. Second, at the presence of first strike uncertainty, there is a perception gap between two opposing sides, which is preferable to strategic stability. In this situation, both sides prefer to overestimate the other side's retaliatory capability while having a clear estimate of their own, so both sides prefer to restrain themselves, and strategic stability is easier to achieve.

The logic of strategic stability through first strike uncertainty is different from that through transparency applied to US-Soviet/Russia strategic relations. In US-Soviet/Russia arms control treaties, each party undertook not to interfere with the national technical means of verification or use concealment measures that impede verification. Both sides also exchange databases related to their strategic offensive forces, including numbers, locations, geographic coordinates and site diagrams.[23] So US and Soviet silos can be seen clearly from Google Earth. But from the Chinese perspective, disclosure of the location of silos would undermine nuclear deterrence credibility and strategic

[22]Mark E. Kipphut, *Crossbow and Gulf War Counter-Scud Efforts: Lessons from History* (Maxwell Air Force Base, ALA: Air Univ. 2003), 17–18.

[23]*Treaty between the United States of America and the Union of Soviet Socialist Republics on the Reduction and Limitation of Strategic Offensive Arms (START I)*, Article IX, <www.fas.org/nuke/control/start1/text/start1.htm.>.

stability. Therefore, China's silos are invisible in Google Earth (this is not to say US reconnaissance satellites could not find them).

Having explored the general idea of first strike uncertainty, we will turn to the role that first strike uncertainty plays in China's nuclear posture in the next section.

The Role of Uncertainty in China's Nuclear Posture

The idea of first strike uncertainty has been reflected in Chinese leaders' planning of their nuclear arsenal. The earliest appearance was Mao Zedong's argument that nuclear weapons are 'paper tigers'.[24] Mao also later stated that 'in the future our country might produce a few atomic bombs, but we do not intend to use them'.[25] Marshal Nie Rongzhen, who oversaw Chinese nuclear weapon and ballistic missile programs, said that the purpose of China's nuclear weapons was to have 'the rudimentary means of counter strike' (*qima de huanji shouduan*) when China sustained nuclear attack.[26] The word 'rudimentary' means that Marshal Nie just expected China's nuclear retaliation to be possible, rather than assured. Deng Xiaoping said in 1983 that from a long term perspective Chinese nuclear weapons were just symbolic.[27]

In China's nuclear posture, mobility and concealment are emphasized greatly in order to induce first strike uncertainty. As for mobile missiles, in August 1978, Deng Xiaoping raised the idea of 'the use of modern weapons for fighting guerrilla war'.[28] The training and deploying mode of Chinese land-based mobile missiles can be roughly concluded from Chinese media reports, as shown in Figure 1. In peacetime, missiles are stored in the underground facilities, and will be dispersed on strategic warning to concealing sites. If a launch order were issued, the missiles would leave concealing sites and head for launch sites.[29] Another approach is that the missiles stay in the underground facilities,

[24]Mao Zedong, *Mao Zedong waijiao wenxuan* [Mao Zedong's selected works on diplomacy] (Beijing: Zhongyang wenxian chubanshe 1994), 57–62.
[25]Mao,*Mao Zedong waijiao wenxuan*, 472–7, 540–1.
[26]Nie Rongzhen, *Nie Rongzhen yuanshuai huiyilu* [Marshal Nie Rongzhen's memoirs] (Beijing: Jiefangjun chubanshe 2005), 645.
[27]Leng Rong and Wang Zuoling, *Deng Xiaoping Nianpu*: 1975–1997 [Chronicle of Deng Xiaoping's life, 1975–1997] (Beijing: Zhongyang wenxian chubanshe 2004), 947–8.
[28]Zhang Aiping (ed.), *Zhongguo renmin jiefangjun* [Contemporary China: The People's Liberation Army of China] Vol. 2 (Beijing: Dangdai zhongguo chubanshe 1994), 118.
[29]Zhao Xianfeng, Bi Yongjun and Wu Xudong, 'Rexue lijian ren: Gao Jin' [A hot-blooded swordsman: Gao Jin], *Jiangfangjun bao* (20 Nov. 2000), 1.

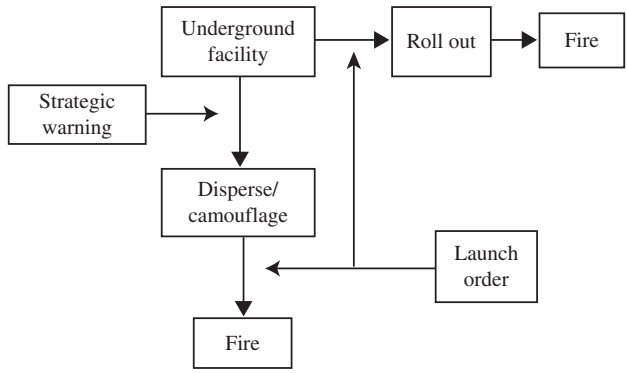

Figure 1. Deployment Mode of Chinese Nuclear Missiles.

absorbing an adversary's first strike. If a launch order were issued, the troops would roll missiles out, and fire.[30]

As mentioned above, the deploying mode of China's mobile ballistic missiles cannot guarantee an assured retaliation. Furthermore, the mobility of China's land-based missiles is constrained by some factors, which make China's missiles more vulnerable. First, the launch units of mobile missiles are composed of a large number of service trucks, which 'makes the weapon more visible to detection by foreign intelligence assets'.[31] For example, the DF-21 launch unit includes six service trucks, for TEL, fire control, power, power distribution, aiming, and inspection respectively.[32] As for liquid missiles (e.g. DF-3), more trucks for propellant are required. Second, Chinese missiles can only be launched on pre-surveyed launch sites and cannot be launched randomly.[33] Theoretically, if the adversary finds and destroys all pre-surveyed sites, then even if the missiles are survivable, they could not be launched.

Concealment and camouflage also play a very important role in the Second Artillery's training and deployment. We can see many discussions in publicly available literature on camouflage technology for missile sites,

[30]'Zhuzao zhonghua heping dunpai: dier paobing fazhan jishi' [Cast the peaceful shield of China: the real record of the development of the Second Artillery], *Renmin ribao* (8 July 1996), 1.
[31]Kristensen, Norris, McKinzie, *Chinese Nuclear Forces and US Nuclear War Planning*, 62.
[32]*Hangtian gongyebu dier yanjiuyuan yuanshi* [History of the Second Academy of the Ministry of Aerospace Industry of China] (Beijing: Hangtian gongyebu dier yanjiuyuan yuanshi bianweihui 1987), 244.
[33]Zhang, *Zhongguo renmin jiefangjun* Vol. 1, 527. Xian Yong, Xiao Long-xu and Li Gang, 'Zuhe zhidao dandao daodan wuyituo kuaisu fashe jishu yanjiu' [Research on Offhand Fast Launch Technique for Integrated Guidance Ballistic Missile], *Yuhang xuebao* 31/8 (Aug. 2010), 1915–19.

TELs, underground facilities and silos.[34] According to Chinese news reports, missiles could be camouflaged well enough to be invisible to the naked eye or Chinese air- and space-based reconnaissance.[35] In order to prevent the opposite side's satellites from detecting moving missiles, once a satellite overfly warning is released, TELs will stop and concealment and camouflage measures will be deployed.[36] An idea of silo camouflage presented in a Chinese book is shown in Figure 2.[37] However, no matter how much effort China puts into concealment and camouflage, Chinese leaders cannot have 100 per cent confidence of being invisible to foreign intelligence systems; at the same time, the opposing side cannot be confident of finding *all* Chinese nuclear weapons either. [38]

While mobility and concealment measures increase China's confidence in nuclear retaliation, another characteristic of its nuclear posture decreases its confidence, that is, the de-alerted status of China's nuclear missiles in peacetime. A textbook of the Second Artillery (Chinese strategic missile force), *Science of Second Artillery Campaigns*, stated that the Second Artillery has nuclear missile bases and nuclear warhead bases, and there are just a few nuclear warheads in the nuclear missile bases during peacetime.[39] Mark Stokes argues that '[Chinese nuclear] warheads are managed in peacetime through a system that is separate and distinct from Second Artillery missile bases and subordinate launch brigades'.[40] From the news reports of China's media, it can be seen that the Second Artillery troops mate the warhead with its boosters at launch sites, and soldiers are trained in peacetime on how to mate the warheads quickly

[34]See, for example, Si Linsuo, Wang Tao and Zhao Junhong, *Daodan Zhendi Anquan Guanli yu Anquan Jishu* [Security Management and Technology of Missile Sites] (Xi'an: Shanxi kexue jishu chubanshe 2007).

[35]Yue Siping (ed.), *Yongyuan de fengbei* [Forever monument] (Beijing: Junshi kexue chubanshe 2008), 543.

[36]Li Yongfei, Wang Yongxiao and Xia Hongqing, 'Tiantian yu jiangjun tongxing: di'er paobing moujidi guanbing xuexi jicheng yangyegong "sizhong jingshen" jishi' [Follow with the general everyday: real record of the study of Yang Yegong's 'four spirits' in a base of the Second Artillery], *Jiefangjun bao* (17 Aug. 2006), 3.

[37]Si, Wang, Zhao, *Daodan Zhendi Anquan Guanli yu Anquan Jishu,* 244.

[38]We cannot conclude from the difficulty of hunting Scuds in the Gulf War that the United States cannot find China's mobile missiles. The US intelligence system puts much more effort on China's nuclear weapons than Iraq's in peacetime, so in wartime the United States would have a much better performance against China.

[39]Yu Jixun (ed.), *Dier Paobing Zhanyi Xue* [Science of Second Artillery Campaigns] (Beijing: Jiefangjun chubanshe 2004), 202. This book is classified as 'secret' (*jimi*), but it is now available at several university libraries in the United States, for example, George Washington University, index No. UA837. D53 2004.

[40]Mark A. Stokes, *China's Nuclear Warhead Storage and Handling System* (Washington DC: Project 2049 Institute, 2010), 2.

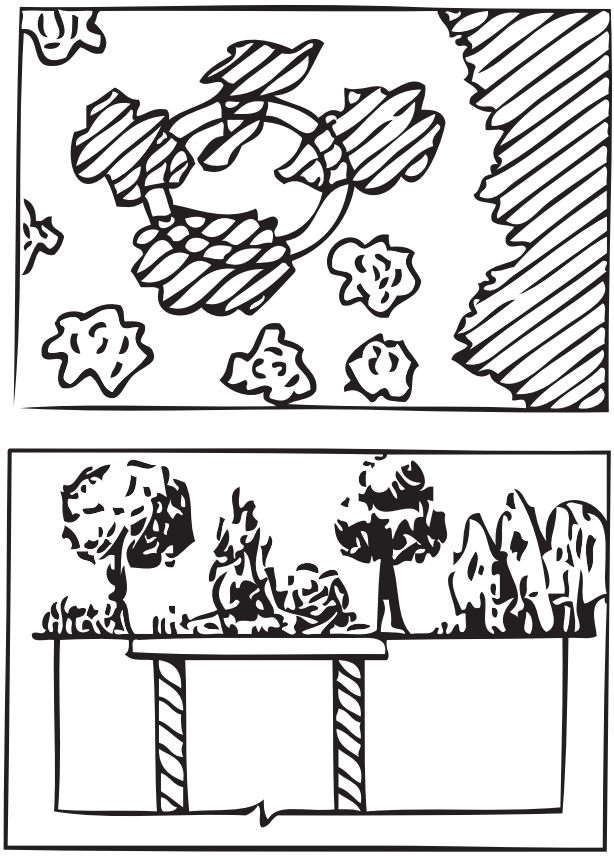

Figure 2. Silo Camouflage.

and accurately.[41] So Li Bin contended that according to the calculating rules applied to the US/Russia arms control treaty, the number of China's deployed nuclear warheads is almost zero.[42]

[41]'Erpao chengwei juyou hefanji zuozhan nengli de zhanlue daodan budui' [The Second Artillery became a strategic missile force with nuclear counter-strike capability], *PLA Daily* website, <www.chinamil.com.cn/item/75/lshm/1980.htm>. Yang Yonggang and Feng Jinyuan, 'Moujidi chuangjilu huodong wei junshi xunlian tian dongli' [Military training improved by record-breaking activities in a base], *Jiefangjun bao* (9 March 2007), 3.

[42]Li Ya, 'Zhongguo hewuku daodi you duoda mei youguan yanjiu shoudao zhiyi' [how many nuclear weapons China has, US Study challenged], 1 Dec. 2011, <www.voanews.com/chinese/news/20111201-China-Nuclear-Arsenal-134842833.html>.

As a result, China's deterrent capability relies on strategic warning.[43] Stokes stated, '[w]arheads are mated with missiles assigned to brigades only in elevated readiness conditions and perhaps on occasion for training purposes.'[44] As noted in *China's National Defense in 2008*: '[i]n peacetime the nuclear missile weapons of the Second Artillery Force are not aimed at any country. But if China comes under a nuclear threat, the nuclear missile force of the Second Artillery Force will go into a state of alert, and get ready for a nuclear counterattack to deter the enemy from using nuclear weapons against China.'[45] The advantage of de-alerting in peacetime is to avoid unauthorized or accidental launch, but the de-alerting status also makes Chinese nuclear arsenal more vulnerable. For example, under some extreme scenarios (unlikely, but still possible), if the adversary launches a bolt-from-the-blue attack, in which strategic warning is unavailable, China's nuclear forces would not have enough time to re-alert. As a result, the probability of nuclear retaliation would be reduced.

It can be concluded that Chinese leaders could not be fully confident of nuclear retaliation. As mentioned previously, there are four approaches to achieve assured retaliation: to build many nuclear weapons; to build very quiet SSBNs; launch-on-warning silo-based missiles; and mobile missiles keeping moving randomly. None of these four approaches applies to China. First, the number of China's nuclear weapons is very low, approximately 240.[46] Compared to the huge American or Soviet/Russian

[43]This article defines strategic warning as signals that show another nuclear state is preparing to launch a nuclear attack on China, which is still under preparation rather than already underway.

[44]Stokes, *China's Nuclear Warhead Storage and Handling System*, 12.

[45]Information Office of the State Council of the People's Republic of China, *China's National Defense in 2008*.

[46]Hans M. Kristensen and Robert S. Norris, 'Chinese nuclear forces, 2011', *Bulletin of the Atomic Scientists* 67/6 (June 2011), 81–7. Some analysts, including Georgetown University professor Phillip Karber and Russian general Viktor Yesin, argue that China has thousands of nuclear weapons rather than hundreds. These arguments are baseless and extremely overestimate China's nuclear capability. In fact, the scale of China's nuclear arsenal can be estimated according to its nuclear material. China is estimated to have an inventory of 1.8 tons of weapon-grade plutonium and 16 tons of highly enriched uranium (HEU). Assume a thermonuclear weapon uses 4kg plutonium and 25kg HEU, China's nuclear material stockpile is enough for 450–640 warheads. Consider a 50 per cent back-up stockpile, China should have roughly 200–300 warheads. Victor Yesin, 'China's Nuclear Capability', in Alexei Arbatov, Vladimir Dvorkin, Sergey Oznobishchev (eds), *Perspectives of China's Participation in Nuclear Arms Limitations* (Moscow: IMEMO RAN 2012), 25–32. Bret Stephens, 'How Many Nukes Does China Have? Plumbing the Secret Underground Great Wall', *Wall Street Journal* (24 Oct. 2011). *Global Fissile Material Report 2010 Balancing the Books: Production and Stocks* (International Panel on Fissile Materials Dec. 2010), <http://fissilematerials.org/library/gfmr10.pdf>, 97–106.

arsenals, China cannot get an assured retaliation capability by numbers. Second, China has been unable to develop very quiet SSBNs. According to a US intelligence report, both China's first- and second-generation SSBNs (Type 092, Type 094) are noisy.[47] So even after Type 094s enter into the force, China will not get assured retaliation capability. Finally, according to China's nuclear posture analyzed in this section, neither the third nor fourth approaches apply to China.

China's self-constrained nuclear posture indicates that its criteria for nuclear deterrence are uncertain retaliation, rather than assured retaliation. This is not to say that China does not want assured retaliation. China has been working hard to improve survivability, and the survivability of Chinese nuclear weapons has been getting better and better, but at the same time Chinese leaders always prioritize political control of nuclear weapons over the consideration of survivability. China could take some measures, such as putting its nuclear forces on alert, to get closer to, if not achieve, the objective of assured retaliation, but it has not done so. This reflects China's belief that uncertain retaliation is enough to deter and nuclear weapons are more political weapons than military ones.

Compared to the United States and other NPT nuclear-weapon states, China's nuclear posture is unique. Both China and the United States acknowledge the massive destructive capability of nuclear weapons and uncertainties associated with nuclear war, however, they act differently in dealing with uncertainties. For the United States, uncertainty is an enemy, and US nuclear forces should be able to deal with all uncertainties,[48] so uncertainty greatly increases nuclear arsenal requirements. As for China, uncertainty is an ally and could help to reduce the requirement for its nuclear arsenal. In other words, the United States is actually doing what China is pretending to do.

It is worthwhile analysing some counterarguments on China's nuclear posture. Alastair Iain Johnston argued that China's nuclear strategy was shifting to limited deterrence.[49] Sixteen years later, his prediction is proved to be false, since there has been no substantial

[47]Office of Naval Intelligence, *The People's Liberation Army Navy: A Modern Navy with Chinese Characteristics* (Suitland, MD: Office of Naval Intelligence 2009), 22.

[48]For example, US nuclear posture does not depend on strategic warning. 'Satisfactory US nuclear operations with intercontinental forces depend in theory on no more than tactical warning for bombers and no warning at all for ballistic missiles.' See Richard K. Betts, *Surprise Attack: Lessons for Defense Planning* (Washington DC: Brookings Institution 1982), 228–54.

[49]Alastair Iain Johnston, 'China's New "Old Thinking": The Concept of Limited Deterrence', *International Security* 20/3 (Winter 1995/1996), 5–42. Alastair Iain Johnston, 'Prospects for Chinese Nuclear Force Modernization: Limited Deterrence versus Multilateral Arms Control', *China Quarterly* 146 (June 1996), 548–76.

change in China's nuclear posture. As Michael Chase and Evan Medeiros correctly pointed out, '[i]n any case, … Beijing is unlikely to have the numbers or types of weapons or command and control infrastructure needed to support a limited deterrence doctrine at the strategic level'.[50] Johnston's article is considered ground breaking, but unfortunately, his methodology is problematic. His assumption is that 'those who think about nuclear doctrine have some influence on those who make decisions about R&D and acquisition'.[51] This is a common mistake by Western experts, who tend to believe that whatever is published by a People's Liberation Army (PLA) officer can in any way be taken as authoritative, and representative of China's official policy or the direction of future policy. In fact, these publications just reflect the authors' own personal opinions, and do not necessarily represent China's current or future policy or strategy.[52]

Thomas Christensen argues that because of China's combination of conventional and nuclear coercive capabilities, there is serious escalatory risk in potential Sino-US conflicts.[53] While sharing his concern with Sino-US nuclear escalation, the author disagrees with his approach. First, Christensen's analysis of China's nuclear strategy is mainly based upon the book *Science of Second Artillery Campaigns*. This book cannot be taken to represent China's nuclear strategy. The Second Artillery is solely responsible for implementing China's nuclear strategy, and not responsible for making it, which is the responsibility of China's political leaders.

[50]Michael S. Chase and Evan Medeiros, 'China's Evolving Nuclear Calculus: Modernization and Doctrinal Debate', in James Mulvenon and David Finkelstein (eds), *China's Revolution in Doctrinal Affairs: Emerging Trends in the Operational Art of the Chinese People's Liberation Army* (Alexandria, VA: The CNA Corp. Nov. 2005), 119–54; see also Michael S. Chase, Andrew S. Erickson and Christopher Yeaw, 'Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States', *The Journal of Strategic Studies* 32/1 (Feb. 2009), 67–114.

[51]Johnston, 'Prospects for Chinese Nuclear Force Modernization'.

[52]Some other scholars argued that China's nuclear strategy is minimum deterrence at strategic level and limited deterrence at theater level. This argument is also wrong. In China's nuclear doctrine, the term 'theater nuclear forces' does not exist. All Chinese nuclear weapons are strategic weapons, the uses of which require the same authorization. Brad Roberts, Robert A. Manning and Ronald N. Montaperto, 'China: The Forgotten Nuclear Power', *Foreign Affairs* 79/4 (July–Aug. 2000), 53–63. Gill, Mulvenon, Stokes, 'The Chinese Second Artillery Corps'.

[53]Thomas J. Christensen, 'The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations', *Journal of Strategic Studies* 35/4 (Aug. 2012), 447–87.

Second, this book's view is consistent with China's declaratory policy, and Christensen misread this book.[54] The book clearly stated, 'Second Artillery deterrent campaigns [include:] on one hand, the wielding of conventional missiles as conventional deterrence against enemies; on the other hand, the wielding of strategic nuclear weapons as anti-nuclear-deterrence against nuclear deterrence from other nuclear states'.[55] The 'anti-nuclear-deterrence' (*fan heweishe*), which is very much similar to Li Bin's anti-coercion description of China's nuclear strategy,[56] is passive and defensive, and Christensen mistranslates this term. For example, one of his quotations of the book says, 'the wielding of nuclear capability as a threat of nuclear counterattack against a strong enemy', which seems active and offensive, but the correct translation should be, 'the wielding of nuclear capability as anti-nuclear-deterrence against a strong enemy', which is by no means threatening. As for the most 'disconcerting' section, 'lower the nuclear deterrence threshold', Christensen ignores one important sentence stating that 'the lowest possible threshold' is to publicly declare the target points.[57] As Gregory Kulacki correctly pointed out, '[c]rossing the threshold is demonstrating they are preparing a retaliatory strike, not, as widely reported, threatening to strike first'.[58]

In sum, first strike uncertainty plays a very important role in China's nuclear posture. It can be concluded that the guiding principle of China's nuclear build-up is first strike uncertainty rather than assured retaliation. In the next section, we will discuss the history of China's nuclear capabilities and the evolution of first strike uncertainty.

Evolution of China's Nuclear Capabilities

This section will focus on the developmental process of China's nuclear capabilities and its implication for first strike uncertainty. A summary of the evolution of China's nuclear capabilities is set forth in Table 1. Only capabilities and uncertainties created by these capabilities will be discussed in this section. The evolution of perceptions of these capabilities and whether or not these uncertainties are enough to deter are the topics of the next section.

[54]In fact, this book is so close to China's policy that one US analyst said it must be China's strategic deception. Larry M. Wortzel, 'China's Nuclear "Leakage"', *The Diplomat* (7 Aug. 2012), <http://thediplomat.com/china-power/chinas-nuclear-leakage/>.
[55]Yu Jixun, *Dier Paobing Zhanyi Xue*, 275.
[56]Li Bin, 'China's Potential to Contribute to Multilateral Nuclear Disarmament'.
[57]Yu Jixun, *Dier Paobing Zhanyi Xue*, 295.
[58]Kulacki, 'Chickens Talking With Ducks'.

Table 1. Evolution of China's Nuclear Capabilities

Designation	Range[a] (km)	Deployed time	Contribution to first strike uncertainty
H-6	5,760	1965	Medium-range bomber; Deliverable nuclear weapons; Low penetration capability
DF-2A	1,250	1966	Semi-mobile missile; Non-storable propellant
DF-3	2,650	1971	Long launch preparation time; Many service trucks; Mobile missile
DF-4	4,750	1983[b]	Longer range; Poor mobility
DF-5	12,000	1981	Capable of targeting the continental United States (CONUS); Silo-based; Liquid propellant
DF-5A	13,000	1993[c]	Capable of targeting the whole CONUS; Silo-based; Liquid propellant
JL-1	1,700	1987[c]	Very noisy SSBN; Never patrolled
DF-21	1,700	1985[c]	Better mobility; Short preparation time; Solid propellant; Range limited
DF-31/ DF-31A	7,200/ 11,200	2007	ICBM range; Road mobile; Solid propellant; Lack of off-road mobility
JL-2	7,200	-	Noisy SSBN; Inadequate range

(a) John Wilson Lewis and Hua Di, 'China's Ballistic Missile Programs: Technologies, Strategies, Goals', *International Security*. 17/2 (Autumn 1992), 5–40. Xie Guang (ed.), *Dangdai zhongguo de guofang keji shiye* [Contemporary China: Defense Science and Technology] Vol. 2 (Beijing: Dangdai zhongguo chubanshe 1995), 202–5. Office of the Secretary of Defense, *Military Power of the People's Republic of China 2008*, 56. (b) Time for design finalization. (c) Time for successful flight-test.

China successfully tested its first atomic device, which was put on a tower and was not deliverable, on 16 October 1964. The second nuclear test on 14 May 1965 involved a gravity bomb, dropped from a modified H-6 bomber. This test marked China's achievement of

deliverable nuclear weapons.[59] The H-6 is a license-built version of the Soviet Tu-16 medium-range bomber. Based on Sino-Soviet agreement in the late-1950s, the Soviet Union provided two Tu-16s and associated technical documents. The first domestically produced H-6 was completed in 1968.[60] According to US intelligence, China's Air Force had approximately 60 H-6s up to 1973.[61]

Besides the H-6, other nuclear capable aircraft include the H-5 bomber and the Q-5 attack aircraft. The H-5 is a Chinese version of the Soviet Il-28. The Soviet Union provided China with 300 Il-28s in 1950s. China began to produce the Il-28 indigenously from 1969.[62] The Q-5 is a Chinese-built ground attack aircraft. The Q-5 was modified to carry hydrogen bombs from 1967 and was successfully tested on 7 January 1972, dropping a hydrogen bomb.[63] None of these aircraft (H-6, H-5, Q-5) is a strategic bomber in the strict sense, given the limited range (5,760 km for the H-6, the longest) and weak penetration capability.[64] So after 1965, although China had nuclear capable aircraft and deliverable nuclear weapons, the efficiency of these aircraft was very low. In other words, these nuclear bombs and aircraft created a degree of first strike uncertainty (for example, the H-6 could theoretically reach Moscow on a one-way mission), but the uncertainty they created was very low and China thereby required nuclear delivery vehicles with higher efficiency, such as ballistic missiles.

The Central Military Committee (CMC) of the Chinese Communist Party (CCP) made the decision to develop ballistic missiles on 26 May 1956.[65] China's missile program received Soviet assistance in its early phase. Moscow provided China with two R-2 missiles at the end of 1957. The Chinese version of the R-2, codenamed DF-1, had a range of 600 km and was flight-tested successfully on 5 November 1960. At this time, however, Moscow also withdrew all Soviet experts working in China.[66] The DF-2 (CSS-1), a modified version of the DF-1 with twice

[59]Xie Guang (ed.), *Dangdai zhongguo de guofang keji shiye* [Contemporary China: Defense Science and Technology] Vol. 1 (Beijing: Dangdai zhongguo chubanshe 1995), 237–47.
[60]Xie Guang, *Dangdai zhongguo de guofang keji shiye*,Vol. 2, 82–7, 202–5.
[61]NIE 13-8-74, 'China's Strategic Attack Programs', 13 June 1974, 23.
[62]NIE 13-8-71, 'Communist China's Weapons Program for Strategic Attack', 28 Oct. 1971, 24.
[63]Song Zhanyuan, 'Jizai kongtou xiaoxing yuanzidan shiyan' [Test of dropping small atomic bombs from an airplane], in Gao Xingmin (ed.), *Kongjun huiyi shiliao* [Recollection materials of the Air Force] (Beijing: Jiefangjun chubanshe, 1992), 601–5.
[64]Xie Guang, *Dangdai zhongguo de guofang keji shiye*, Vol. 2, 202–5.
[65]Xie Guang, *Dangdai zhongguo de guofang keji shiye*, Vol. 1, 28–9.
[66]Dangdai zhongguo congshu bianjibu (ed.), *Dangdai zhongguo de hangtian shiye* [Contemporary China: Space Industry] (Beijing: Shehui kexue chubanshe 1986), 15.

the range, is capable of striking US military bases in Japan if deployed in northeast China.[67] The first flight test of the DF-2 failed in 1962. In 1964, after significant redesign, the DF-2 was successfully flight-tested.[68] The DF-2A is an improved version of the DF-2, transforming the inertial-radio guidance system of the DF-2 to full-inertial guidance and possessing an extended range. The DF-2A was flight tested successfully on 13 November 1965. On 27 October 1966, China successfully tested a DF-2A armed with a live nuclear warhead.[69] After that, the DF-2A entered into service.

The DF-1 has three operational drawbacks. First, it uses non-storable propellant (liquid oxygen and ethanol), meaning that a fueled missile has to be launched in hours. Second, loading of propellant requires huge equipment, restraining the missile's mobility. So the DF-1 is just semi-mobile, requiring fixed supporting facilities.[70] Third, the DF-1 uses an inertial-radio mixed guidance system, whose signal could be easily detected and interfered with during wartime. The DF-2 retains all these three drawbacks. The DF-2A moves to full-inertial guidance system, but still uses non-storable propellant.

Compared to Chinese bombers, first strike uncertainty created by the DF-1/DF-2/DF-2A was higher because the shift from bombers to ballistic missiles marked a great leap in penetration capability. But the improvement was still limited. First, because of the drawbacks mentioned above, the pre-launch survivability of the DF-1/DF-2/DF-2A remained problematic. Second, the coverage of the DF-1/DF-2/DF-2A was limited, such that only US bases in Japan and South Korea and several Soviet cities in the Russian Far East could be held at risk.

The DF-3 (CSS-2) was the first storable liquid propellant ballistic missile designed by China. Its range is 2,650 km, which is enough to reach the US military bases in Philippine.[71] Its full range flight-test succeeded in 1968, and it was deployed from May 1971.[72] The DF-3 represented the bulk of Chinese nuclear missiles. China deployed 110 DF-3s in the mid-1980s, according to a US intelligence estimate.[73]

[67]John Wilson Lewis and Hua Di, 'China's Ballistic Missile Programs: Technologies, Strategies, Goals', International Security 17/2 (Autumn 1992), 5–40.
[68]Zhou Junlun (ed.), *Nie Rongzhen nianpu* [Chronicle of Nie Rongzhen's life] Vol. 2, (Beijing: Renmin chubanshe 1999), 820. Zhang, *Zhongguo renmin jiefangjun*, Vol. 1, 523.
[69]*Hangtian gongyebu dier yanjiuyuan yuanshi*, 42–46.
[70]NIE 13-8-67, 'Communist China's Strategic Weapons Program', 3 Aug. 1967, 7.
[71]Lewis and Hua, 'China's Ballistic Missile Programs', 5–40.
[72]Li Chengzhi, *Zhongguo hangtian jishu fazhan shigao* [A draft history of space technology in China] Vol. 2 (Jinan: Shandong jiaoyu chubanshe 2006), 322–335. Lewisand Hua, 'China's Ballistic Missile Programs', 5–40.
[73]US Defense Intelligence Agency, 'Nuclear Weapons Systems in China', DSB-49-84, 24 April 1984.

The pre-launch preparation time of DF-3 was no less than four hours initially, because the propellant must be loaded after the missile is erected and the oxidizer and fuel were loaded separately. Then it was shortened to two and a half hours by loading the oxidizer and fuel simultaneously in 1978.[74]

Compared to the DF-2A, the first strike uncertainty created by the DF-3 was much higher. First, the DF-3 is a mobile missile. As such no fixed facility was needed because of the adoption of storable propellant. Second, the DF-3's target coverage is much larger than the DF-2A. But because of its long pre-launch preparation time, the DF-3 is far from a perfect weapon.

The DF-4 (CSS-3) is the first two-stage ballistic missile designed by China, which was based on the DF-3, adding a second stage. DF-4 flight tests began in 1969, but because of the debate about its deployment mode, the design finalization of the DF-4 was not finished until 1983.[75] The final deployment mode adopted by the DF-4 was 'in-cave storage/preparation and out-cave erection/filling/firing'.[76] The influence of the introduction of the DF-4 on first strike uncertainty was mixed. On one hand, the target coverage of the DF-4 is larger than the DF-3, increasing first strike uncertainty; on the other hand, the DF-4's mobility is less than that of the DF-3, decreasing first strike uncertainty.

The DF-5 (CSS-4) is a storable liquid propellant two-stage ICBM and is the father of China's space launch vehicles. On 18 May 1980, the DF-5 passed a full range flight-test.[77] It was first deployed in 1981, and up to 1992, there were only four DF-5s deployed.[78] The US Department of Defense (DOD) report believed that China had about 20 DF-5s.[79] An extended-range version, DF-5A, developed to cover the whole continental United States, was first flight-tested in 1993.[80] The DF-5/DF-5A is silo-based and its survivability depends on the camouflage and concealment of its silo. The most important contribution of the DF-5/DF-5A to first strike uncertainty is its target coverage, marking the first time in history that China held the continental United States at risk, meaning a great psychological shock to the United States.

The development strategy of China's first-generation solid ballistic missiles consisted of developing a submarine launched ballistic missile (SLBM) (JL-1) first then modifying it to a land-based mobile missile (DF-21, CSS-5),

[74]Lewis and Hua, 'China's Ballistic Missile Programs', 5–40.
[75]Li, *Zhongguo hangtian jishu fazhan shigao*, Vol. 2, 335–47.
[76]Lewis and Hua, 'China's Ballistic Missile Programs', 5–40.
[77]Li, *Zhongguo hangtian jishu fazhan shigao*, Vol. 2, 347–63.
[78]Lewis and Hua, 'China's Ballistic Missile Programs', 5–40.
[79]Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2010*, 66.
[80]Xu Jian, 'Li Xuge'.

known as the *julang shang'an* (JL go ashore). The JL-1 program was formally set up in 1967. On 12 October 1982, the JL-1 passed its first successful flight-test launched from an underwater test submarine. In 1985, the JL-1 suffered three consecutive failures (from its associated SSBN, the Type 092). In the same year, the DF-21 was successfully launched from a TEL. After redesign, the JL-1 passed two consecutive flight tests on 15 and 27 September 1987, launched from the Type 092 SSBN.[81]

Generally speaking, the survivability of SLBMs is better than that of land-based missiles. But because the Type 092 SSBN is noisy, JL-1's operability was constrained. It is reported that Type 092 has never conducted a deterrent patrol.[82] As a solid-fuel missile with greater mobility and shorter pre-launch preparation time, the DF-21 signified a fundamental achievement in creating first strike uncertainty. The drawback of the DF-21 is its limited range, which could only cover targets close to China. China needed solid-fuel missiles with longer range.

The development strategy of China's second-generation solid ballistic missiles was that of developing a mobile ICBM (DF-31) first, then modifying it to a SLBM (JL-2), the so-called *dongfeng xiahai* (DF go to sea).[83] The DF-31 passed its first successful flight-test in 1999; in 2007, the DF-31 and DF-31A, its extended-range version, became operational according to US DOD.[84] It is reported that the JL-2 confronted with technological difficulties, lagged behind its associated SSBN (the Type 094).[85] The DF-31 and DF-31A represent the highest level of the first strike uncertainty created by Chinese nuclear weapons. The Type 094 SSBN is not quiet either, according to US intelligence, so after the Type 094/JL-2 enters into service, China will not be able to realize assured retaliation.[86]

[81]*Hangtian gongyebu dier yanjiuyuan yuanshi*, 224–51. Li, *Zhongguo hangtian jishu fazhan shigao* Vol. 2, 388. Liu Gang and Qian Xiaohu, 'Shenhai qingjian 46 zai' [Holding swords in deep sea 46 years], *Jiefangjun bao* (28 Jan. 2011), 1.

[82]Hans Kristensen, 'China's Submarine Fleet Continues Low Patrol Rate', 7 Feb. 2007, <www.fas.org/blog/ssp/2007/02/post_2.php#more>.

[83]Lewis and Hua, 'China's Ballistic Missile Programs', 5–40.

[84]David C. Isby, 'China Tests DF-31 ICBM', *Jane's Missiles and Rockets* (1 Feb. 2001); Office of the Secretary of Defense, *Military Power of the People's Republic of China 2008*, 3.

[85]Office of the Secretary of Defense, *Annual Report to Congress: Military and Security Developments Involving the People's Republic of China 2011*, 34.

[86]Office of Naval Intelligence, *The People's Liberation Army Navy*, 22. Wu Riqiang, 'Survivability of China's Sea-Based Nuclear Forces', *Science & Global Security* 19/2 (2011), 91–120.

After reviewing the history of China's nuclear capabilities, we will discuss the evolution of perceptions of China's nuclear capabilities in the next section.

Evolution of Perceptions of China's Nuclear Capabilities

In this section, we will review the evolution of perceptions of China's nuclear capabilities. Both Chinese and foreign leaders' perceptions will be discussed. The purpose is to find out the turning points of the perceptions, namely when did Chinese and foreign leaders begin to believe that China possessed nuclear retaliatory capability. The turning points represent the criteria of Chinese and foreign leaders for nuclear deterrent capability.

Perceptions in Late-1960s and Early-1970s

Chinese and Soviet perceptions of China's nuclear capabilities during this period can be revealed through the 1969 Sino-Soviet border conflict, which provided a good historical case showing how much uncertainty is *not* enough.[87] During this crisis, Soviet leadership seriously considered using nuclear weapons against China.[88] Accordingly, the Soviet Union released a

[87]Yang Kuisong, *Zhonghua renmin guoheguo jianguoshi yanjiu 2* [Historical research of the founding of the People's Republic of China 2] (Nanchang: Jiangxi renmin chubanshe 2006), 266–95. Chi Zehou, '"yihao haoling" fachu qianhou' [The issuing of the No. 1 order], in Ding Kaiwen (ed.), *Chongshen Lin Biao zui'an* [New concepts of Lin Biao's incident] Vol. 1, (New York: Mirror Books 2004), 91–131. Zhang Yunsheng, 'Shihua shishuo "yihaoling"' [Facts about the No. 1 order], in Ding (ed.), *Chongshen Lin Biao zui'an* Vol. 1, 63–90. Zhang was Lin Biao's secretary in 1969. Wu Faxian, *Suiyue jiannan: Wu Faxian huiyilu* [Hard years: Wu Faxian's memoir] (Hongkong: Beixing chubanshe 2006), 760–8. John Wilson Lewis and Xue Litai, *Imaged Enemies: China Prepares for Uncertain War* (Stanford UP 2006), 44–74.

[88]According to Arkady Shevchenko, a defector and former deputy secretary of the United Nations, in a Politburo conference, Marshal Andrei Grechko, the Defense Minister, called for unrestricted use of nuclear weapons to 'once and for all get rid of the Chinese threat'. On 18 August 1969, a mid-level Soviet diplomat in Washington was instructed to query US reaction to a potential Soviet strike on Chinese nuclear facilities. In late August, American intelligence detected a stand-down of the Soviet air force in the Russian Far East, 'which permits all aircraft to be brought to a high state of readiness simultaneously, is often a sign of a possible attack; at a minimum it is a brutal warning in a intensified war of nerves'. Arkady N. Shevchenko, *Breaking with Moscow* (New York: Knopf 1985), 164–6. Henry Kissinger, *The White House Years* (Boston: Little, Brown 1979), 183–4.

series of nuclear threats.[89] China overreacted to these Soviet threats. Most of China's top leaders dispersed from Beijing. Marshal Lin Biao, who was in charge of the CMC's daily affairs, issued 'No. 1 Order' on 17 October 1969, placing all Chinese military forces, including the Second Artillery, on alert. This is the only time that Chinese nuclear forces were put on alert.

At that time, the Soviet Union did not consider China as being able to conduct a nuclear retaliation.[90] Vitaly Shlykov, a former Soviet military intelligence officer who oversaw intelligence estimates during the early-1970s, recalled that during this period the Soviets did not fear China's nuclear potential.[91] It is China's 'people's war strategy' rather than nuclear weapons that deterred the Soviet Union from undertaking a nuclear strike against China. In his book, Shevchenko said that in 1970 he had a conversation with Marshal Nikolai Ogarkov. The latter told him that a large-scale nuclear strike against China would inevitably mean world war and that a 'surgical strike' would lead to endless guerrilla warfare.[92]

Chinese leaders were also not confident of their nuclear retaliatory capability. During the airport meeting with Alexei Kosygin on 11 September 1969, Premier Zhou stated that if the Soviet Union launched a preventive war, China would resist it 'to the end'.[93] It is worth noting that Premier Zhou did not mention nuclear retaliation, he appealed to China's tradition of conducting a people's war. On 23 November 1969, Premier Zhou Enlai said: 'they [the Soviet Union] wanted to intimidate us by atomic bombs, based on their position of strength. This cannot frighten us.'[94] Again, he did not mention China's nuclear retaliation at all.

Chinese leaders' perception resulted from their clear understanding that China's nuclear forces were too weak. As mentioned above, Chinese nuclear weapons deployed at that time included two H-6 bombers and a small number of DF-2/DF-2A medium range ballistic missiles (MRBMs). Chinese leaders were not satisfied with both of these

[89]A *Pravda* editorial of 28 August 1969 said that in a war with China, 'lethal armament and modern means of delivery would be involved'. Victor Louis, a well-known KGB agent, published an article in the *London Evening News* on 16 September indicating a potential Soviet nuclear attack on China's nuclear facilities. Harry Gelman, *The Soviet Far East Buildup and Soviet Risk-Taking Against China* (Santa Monica, CA: RAND Corp. 1982), 37–40.

[90]Goldstein, 'Do Nascent WMD Arsenals Deter?', 53–80.

[91]Ibid.

[92]Shevchenko, *Breaking with Moscow*, 164–6.

[93]Mikhail Kapitsa, 'Kosygin yu Zhou Enlai zai Beijing jichang de huitan' [Kosygin-Zhou Enlai talks in the Beijing airport], *Zhonggong dangshi yanjiu* 1 (1997), 62–8.

[94]Zhonggong zhongyang wenxian yanjiushi (ed.), *Zhou Enlai nianpu: 1949–1976* [Chronicle of Zhou Enlai's life: 1949–1976], Vol. 3, (Beijing, Zhongyang wenxian chubanshe 2007), 335.

two delivery vehicles and doubted their survivability and penetration capability. Regarding the H-6 bomber, Marshal Nie said in October 1965, 'Soviets said it was not good in 1957 and they did not produce it anymore. It is clumsy, slow, and vulnerable to adversary's radars and missiles.'[95] The reason China produced the H-6 is because: 'if we do not produce this plane now, we are unable to design medium-range bombers indigenously, so I agree to produce tens of Tu-16s during the third five-year plan, on one hand, as equipment complement, on the other hand, as means of technical training.'[96] Regarding the DF-2, Marshal Nie stated in 1963, 'Although it is not perfect, it is still useful. It can be used for training technicians and troops, which is good for follow-on research and improvement.'[97] In July 1964, he said, 'Regarding the DF-2, after design finalization, we should produce a batch of operational missiles as well as training missiles, and try to flight test it with atomic warhead. … [A]t least it can embolden ourselves.'[98] So Chinese leaders' expectation for the DF-2 is just 'training troops' and 'embolden ourselves', rather than deterrent or operational capability.

Chinese leaders' lack of confidence also resulted from the chaotic status of China's nuclear forces and defense industry. On 6 June 1966, the Central Committee and the CMC of the CCP jointly decided to set up China's strategic missile force, named the Second Artillery. It was formally established on 1 July. The Second Artillery was established based on the merger of the People's Public Security Force of China and the division of the Artillery Corps responsible for missiles, which resulted in a serious clique struggle. The leadership of the Second Artillery did not take office for a long time. On 4 July 1967, the CMC appointed General Xiang Shouzhi as the commander, General Li Tianhuan as the political commissar. Surprisingly, this appointment of commanders was not announced for a long time. General Xiang himself did not know. Forty-three days after that appointment command was made, General Xiang was denounced, without knowing of the appointment, let alone taking office.[99]

During the Cultural Revolution, the Seventh Ministry of Machine Building, which is responsible for the development and production of ballistic missiles, suffered serious clique struggles and disorder. Premier Zhou met with two cliques in the ministry a number of

[95]Zhou, *Nie Rongzhen nianpu*, Vol. 2, 1003.
[96]Ibid.
[97]Ibid., 905.
[98]Ibid., 942–3.
[99]Xiang Shouzhi, *Xiang Shouzhi huiyilu* [Xiang Shouzhi's memoir] (Beijing: Jiefangjun chubanshe 2006), 334.

times to try to moderate the conflicts.[100] Clique struggles greatly disturbed normal development and production activities. For example, Plant 230, which is responsible for the production of the stabilizing platform for the DF-5s and CZ-2 space launch vehicles, had produced only seven platforms from 1971 to 1977. After the Cultural Revolution, they produced five platforms during the first half of 1978.[101] The chaos in the Cultural Revolution also resulted in military products with very low quality. Premier Zhou stated in 1970 that 'under the shock of the Cultural Revolution, many waste products have appeared in our military products. The effective product inspection system of the past should be retained.'[102] In 1971, Marshal Ye Jianying was given the responsibility of consolidating the quality of military products.[103] Late in 1975, Marshal Ye still expressed his worries about the quality of Chinese military products.[104]

In the late-1960s and early-1970s, the United States did not think China had nuclear retaliatory capability either. In 1967, the US intelligence estimate believed that the DF-2 should be ready for deployment, the production plant for the H-6 was completed and China would begin to deploy these two weapons in 1967 or 1968.[105] In 1971, the US intelligence community believed that China had deployed a small number of DF-2s and 30 H-6s. The general evaluation of China's nuclear forces in 1971 was that 'China is now in a critical transition phase', because the important DF-3 missile was ready for deployment.[106] Consistent with the US intelligence community, in August 1971, Kissinger said, '[i]n fact we have no disarming capability against the USSR but we do have some against China.'[107]

In sum, neither Chinese nor American/Soviet leaders thought China had nuclear retaliatory capability in the late-1960s and early-1970s. This situation indicates that first strike uncertainty created by H-6 and DF-2/DF-2A was not enough. It was H-6's poor penetration capability

[100]Zhonggong zhongyang wenxian yanjiushi, *Zhou Enlai nianpu: 1949–1976*, Vol. 3, 295–6, 305, 309–10, 311–12.
[101]Song Renqiong, *Song Renqiong huiyilu xuji* [The sequel to Song Renqiong memoir] (Beijing: Jiefangjun chubanshe 1996), 49. Song was the Minister of the Seventh Ministry of Machine Building from Oct. 1977 to Dec. 1978.
[102]Zhonggong zhongyang wenxian yanjiushi, *Zhou Enlai nianpu: 1949–1976*, Vol. 3, 377.
[103]*Zhongguo renmin jiefangjun junshi,* Vol. 6, 213–14.
[104]Liu Jixian (ed.), *Ye Jianying nianpu* [Chronicle of Ye Jianying's life] Vol. 2, (Beijing: Zhongyang wenxian chubanshe 2007), 1102–3.
[105]NIE 13-8-67, 10–11, 15.
[106]NIE 13-8-71, 3, 24, 33.
[107]US National Security Council, Memorandum of Conversation, 'Subject: Minutes of NSC Meeting on Defense Strategy', 13 Aug. 1971.

and DF-2/DF-2A's poor pre-launch survivability that made Chinese leaders lack confidence in nuclear retaliation and made foreign leaders confident of a 'surgical strike'. We will see how these perceptions changed in following sections.

Perceptions in Mid-1970s

In the mid-1970s the negative effect of the Cultural Revolution continued, despite the interim attempt to adjust in 1975. In this year, Deng Xiaoping resumed and began to conduct consolidation and adjustment in all industries. On 8 March, General Zhang Aiping was appointed as the director of the Defense Science and Technology Commission. Solving the issue of clique struggles in the Seventh Ministry of Machine Building was his most notable work.[108] General Zhang's consolidation led to a positive net effect on China's missile/space industry. From 1972 to 1974, China launched just one satellite and failed, but in 1975, China successfully launched three satellites.[109] At the end of 1975, Deng Xiaoping was again denounced, as was General Zhang.[110]

It is easy to understand why Chinese leaders were still not confident of nuclear retaliation in mid-1970s. Premier Zhou warned the Second Artillery of becoming an 'empty shell'.[111] Up to the end of the Cultural Revolution, the Second Artillery had not yet established independent capability to launch missiles without outside technical support from the defense industry or missile test bases.[112] General Li Shuiqing, former commander of the Second Artillery, recalled that during this period, 'although one type of MRBM, as a main battle equipment, has been equipped, there were very few missile regiments with independent launch capability'.[113]

Contrary to China's chaotic domestic situation, during this period, because of the deployment of the DF-3s, both American and Soviet evaluations changed simultaneously. A US intelligence estimate in 1974

[108] *Zhongguo renmin jiefangjun junshi,* Vol. 6, 279–80.
[109] *Zhongguo renmin jiefangjun junshi*, Vol. 6, 286.
[110] Zhang Sheng, *Cong zhanzheng zhong zoulai: liangdai junren de duihua* [Coming from the war: dialogues between two generations of military officers] (Beijing: Zhongguo qingnian chubanshe, 2007), 389.
[111] Xu Jian, *Daguo Changjian: Zhongguo Zhanlue Daodan Budui Jishi* [the Long Sword of a Great Power: A Description of China's Strategic Missile Force] (Beijing: Zuojia Chubanshe 1995), 123.
[112] Zhang, *Zhongguo renmin jiefangjun*, Vol. 2, 111–12.
[113] Li Shuiqing, *Cong hongxiaogui dao huojianbing siling: Li Shuiqing jiangjun huiyilu* [From a little revolutionary soldier to the commander of the rocket forces: General Li Shuiqing's memoir] (Beijing: Jiefangjun chubanshe 2009), 511–12.

argued that 'China's force suffers from a number of vulnerabilities but has achieved a measure of survivability through concealment, mobility, and hardening', and so China had achieved 'a modest but credible nuclear retaliatory capability against the USSR'.[114] This is the earliest US intelligence evaluation showing that China had nuclear retaliatory capability. On the Soviet side, internal intelligence estimates are not available, but Colonel Viktor V. Stefashin, a professor at the Academy of Military Sciences and an expert on Chinese nuclear forces, argued that substantial Chinese nuclear forces were only created in 1974, consistent with US evaluations.[115] It is understandable that the United States and the Soviet Union made the same evaluation of China's nuclear retaliatory capability. Although Soviet space imaging technology had lagged behind the United States in 1970s,[116] as far as the general evaluation of China's nuclear capability is concerned, they had roughly equivalent intelligence capability. Besides, geographic proximity to China also gives the Soviets/Russians an advantage in signals intelligence.

The turning point in the mid-1970s of foreign leaders' perception of China's nuclear capability, deduced by DF-3's deployment, represents their criterion of China's nuclear retaliatory capability. In fact, NIE 13-8-74 outline the criterion clearly: 'China's force … has achieved a measure of survivability through *concealment*, *mobility*, and *hardening*' (emphasis added). The measure of 'hardening' does not make sense in an asymmetric scenario and will not be considered in this article. The other two measures, 'concealment' and 'mobility', plus 'delivery capability', constitute foreign leaders' criterion of nuclear retaliatory capability. If a state built mobile nuclear missiles able to target the potential adversary's homeland or overseas bases, and took measures to conceal them, it would be considered as being able to conduct nuclear retaliation after absorbing a disarming strike. This threshold is not high. As discussed in previous sections, the DF-3's survivability was not good (liquid propellant, many service trucks required, four hours launch preparation time), and the number of deployed DF-3s was low (about 25),[117] but, surprisingly, such a far-from-perfect weapon made

[114]NIE 13-8-74, 1, 3.

[115]V. Stefashin, 'Evolyutsiya Voennoy Strategii Kitaya' [The Evolution of China's Military Strategy], *Voennaya Mysl* 3 (March 1994), 73, quoted from Goldstein, 'Do Nascent WMD Arsenals Deter?'

[116]William E. Burrows, *Deep Black: Space Espionage and National Security* (New York: Random House 1986), 255–67.

[117]Thomas B. Cochran, Milton M Hoenig, and William M Arkin (eds), *Nuclear Weapons Databook: British, French, and Chinese Nuclear Weapons* (Cambridge, MA: Ballinger 1984), 359.

American/Soviet leaders believe that they could not destroy all of them in a disarming strike and China could use it in retaliation.

In sum, in the mid-1970s, Chinese leaders did not think that China had nuclear retaliatory capability. On the contrary, during the same period, the United States and the Soviet Union thought that China had already created nuclear retaliatory capability. This leads to the question of when Chinese leaders would begin to be confident of nuclear retaliatory capability. The answer to this question will be discussed in the next two sections.

Perceptions in the Late 1970s to the Early 1980s

After the Cultural Revolution, China's most important task was consolidation. A working group was set up in March 1977 to conduct the consolidation of China's space industry. In April 1978, this working group finished its work and was dismissed.[118] Regarding the Second Artillery, in September 1977, General Li Shuiqing was appointed as the commander and began consolidating the Second Artillery. By September 1979, the status of the Second Artillery gradually returned to normal.[119]

During this period, the Second Artillery's primary task was to gain independent launch capability without outside support. In an exercise in March 1977, the Second Artillery troop conducted its first independent launch.[120] This exercise marked a great leap in the Second Artillery's capability. But this was just the very beginning of the Second Artillery's training for independent launch. In the early-1980s, General Li recalled that although the Second Artillery had conducted an independent launch exercise, only one missile regiment was involved and the type of missile launched was an old retiring one.[121]

The Second Artillery was also undertaking measures to improve the training levels of troops. In September 1983, the Second Artillery conducted its first campaign exercise, during which four IRBMs were successfully fired.[122] In early 1980, the Second Artillery also solved the problem of a 'hibernation period', which means that every year

[118]Song, *Song Renqiong huiyilu xuji*, 36–7.
[119]Li, *Cong hongxiaogui dao huojianbing siling*, 502–10.
[120]Han Huaizh and, Tan Jingqiao (eds), *Dangdai zhongguo jundui de junshi gongzuo* [Contemporary China: military affairs of PLA] Vol. 2 (Beijing: Zhongguo shehui kexue chubanshe 1989), 324.
[121]Li, *Cong hongxiaogui dao huojianbing siling*, 522–5.
[122]Han and Tan, *Dangdai zhongguo jundui de junshi gongzuo* Vol. 2, 321–7. Li Xuge, 'Yitian zhujian' [Casting the sword leaning the sky] in Guangrong jiyi zhongguo renmin jiefangjun zhengcheng qinliji bianweihui (ed.), *Jingbing Zhilu* [The road of troop reductions] (Beijing: Jiefangjun chubanshe 2007).

after the demobilization of veterans, the Second Artillery could not operate missiles for a half year. Separating the training of the new recruits and the veterans solved this problem. The new recruits were trained in a special training unit before entering combat troops.[123]

We can see from the Chinese leaders' speech that they still lacked confidence in China's nuclear retaliatory capability. In 1978, Deng Xiaoping said, 'we do not worry about Soviet invasion … China is undeveloped with very few symbolic atomic bombs. But China has three characteristics: big territory, large population and with experience and endurance of long-standing war. Our strategy is Chairman Mao's people's war, fighting protracted war.'[124] This statement is very much similar to Premier Zhou's in 1969, China appealed to people's war strategy rather than nuclear retaliation to deter aggression. In 1981, General Zhang said that China had two weak points (*guangtou*). One was nuclear weapon and the other was the Air Force.[125]

Other countries' evaluation of China's nuclear retaliatory capability, following the mid-1970s, is unavailable. But it is reasonable to assume that first strike uncertainty would be gradually enhanced as China continuously modernized its nuclear forces. The United States and the Soviet Union were also improving their reconnaissance capability to get better accuracy and higher resolution, but technology advancement could not give them the confidence of a completely successful disarming strike that the technology of the mid-1970s did not give. So we can conclude that from the mid-1970s on, other countries considered China able to absorb a first strike and launch nuclear retaliation.[126]

Perceptions in Mid-1980s and Later

In 1984, the Second Artillery entered combat duty, indicating that Chinese leaders became confident of their retaliatory capability.[127] In 1985, an article in the journal *Liaowang* said China possessed nuclear counterattack capability.[128] Chinese leaders also began to talk of China's nuclear retaliatory capability. In December 1986, General Zhang said, 'under adversary's

[123]Zhang, *Zhongguo renmin jiefangjun*,Vol. 2, 120.
[124]Leng, Wang, *Deng Xiaoping Nianpu*, 135–6.
[125]Zhang Aiping, *Zhang Aiping junshi wenxuan* [Selected military works of Zhang Aiping] (Beijing: Changzheng chubanshe 1994), 371–78.
[126]In fact, only the turning point of perception is important in this article, whether or not the turned perception turned back again is not so important.
[127]Zhang, *Zhongguo renmin jiefangjun*, Vol. 2, 113.
[128]Guo Qingsheng, 'Zhongguo yongyou hefanji nengli: fang zhongguo zhanlue daodan budui' [China possessed nuclear counter strike capability: interview in China's strategic missile force], *Liaowang* (22 April 1985), 23–5.

nuclear threat, we worked out nuclear weapons, although the number is low, and quality poor, we had capability to strike back'.[129] The leaders of the Second Artillery stated in January 1988 that the Second Artillery had a certain capability of nuclear counterattack combat.[130]

After entering combat duty, there was still huge room for improvement in Second Artillery training. In 1984, the Second Artillery began to conduct integrated training of missile battalions. The reason for this was that, in order to conduct combat missions, as well as operating missiles and launchers, missile troops need other supporting elements such as target intelligence, geodesy, weather forecast, firing data, engineering protection, electronic countermeasures, early warning, air defense, nuclear detonation detection, command/control/communication and logistics.[131] On this basis, the Second Artillery conducted integrated trainings at the level of missile brigades during the mid-1990s. The purpose was so that all the battalions affiliated with the same brigade could conduct combat missions simultaneously and the brigade command could organize, control and support all the battalions simultaneously.[132]

The Second Artillery also put great effort into building missile sites. In the summer of 1995, the 'Great Wall Project' was completed, which took more than ten years.[133] The purpose of this project was to construct underground facilities for land-based strategic missiles to increase survivability. Details of this project are classified. According to foreign media, the project stipulated that there should be a series of underground facilities, interconnected by tunnels.[134]

[129]Zhang, *Zhang Aiping junshi wenxuan*, 573–84.

[130]Chen Zhiqiang, Zhao Su and Cheng Guanglong, 'Juyou yiding hefanji nengli woguo zhanlue daodan budui chuju guimo' [With some nuclear counter strike capability Our strategic missile force achieve initial scale], *Renmin ribao* (9 Jan. 1988), 1.

[131]Han and Tan, *Dangdai zhongguo jundui de junshi gongzuo*, Vol. 2, 321–7.

[132]Yang Guoliang, 'Kuaisu fazhan erpao zuozhan liliang jianshe de lishixing kuayue' [The historical leap of the rapid development of the Second Artillery's combat capability build-up], in Di'er paobing zhengzhibu (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), 215–23.

[133]Xu Jian, *Niaokan diqiu: Zhongguo zhanlue daodan zhendi gongcheng jishi* [A bird's eye view of the earth: A description of the site engineering of China's strategic missiles] (Beijing: Zuojia chubanshe 1997), 495–500. Zhang Xuanjie et al., 'Duanzao gongheguo heping dunpai: Jiang Zemin zhuxi guanxin di'er paobing jianshe jishi' [Casting the peaceful shield of the Republic: Real record of Chairman Jiang Zemin's caring on the Second Artillery's build-up], *Renmin ribao* (20 March 2002), 1.

[134]'China Builds Underground "Great Wall" Against Nuke Attack', *The Chosun Ilbo*, (14 Dec. 2009), <http://english.chosun.com/svc/news/printContent.html>.

China's CCTV released some videos of the tunnels, which showed that the tunnels were big enough to house heavy vehicles and there were rails on the ground.[135] The completion of this project further increased Chinese leaders' confidence in the survivability of China's strategic missiles.

The turning point in the mid-1980s of Chinese leaders' perception represents China's criterion of nuclear deterrence. Three events occurred in this period: the deployment of DF-4 and DF-5, and China's nuclear forces gained independent launch capability. The key factor that resulted in the perceptual turn is the last one, because China's main adversary was the Soviet Union at that time, China's DF-3 already had substantial coverage of it. Compared to American/Soviet criteria (concealment, mobility, and delivery capability), as discussed in a previous section, China's criteria require one more element: operability (independent launch capability without outside technical support). During this period, China had about 110 DF-3s, 8 DF-4s and 2 DF-5s.[136] All these missiles use liquid propellant, with limited or no mobility, but Chinese leaders began to be confident of nuclear retaliatory capability.

There is a ten-year perception gap between when foreign countries began to consider China as being capable of nuclear retaliation and when China began to consider itself as being capable of nuclear retaliation. The perception gap is rooted in the worst-case assumption adopted by the United States and the Soviet Union in evaluating China's military capabilities. Because of the existence of intelligence uncertainty, decision-makers prefer to overestimate the opposite side's capabilities. It is relatively easy to find evidence for missile deployment, but it is hard to find evidence for its operability. Therefore, a natural method is to assume that all deployed missiles are operational. This perception gap is favorable to strategic stability, because both sides would prefer to restrain themselves, rather than to challenge the other side.

Conclusions

In this article, we reviewed the developmental history of China's nuclear capability and the evolution of Chinese and foreign leaders' perceptions of China's nuclear retaliatory capability, which leads to the answer to the question: how much first strike uncertainty created by Chinese nuclear forces is enough to deter foreign nuclear attack? The answers from Chinese and foreign leaders are different. For foreign leaders, the

[135]'Junshi jishi' [Military record], CCTV, 24 March, 2008.
[136]US Defense Intelligence Agency, 'Nuclear Weapons Systems in China'.

first strike uncertainty created by liquid-propellant mobile nuclear missiles, and enhanced by concealment measures, was enough. The threshold is surprisingly low. After China deployed the DF-3 IRBMs in the mid-1970s, although the number was low (about 25), and the missile had poor survivability (liquid propellant, many service trucks required, four hours launch preparation time), the United States and the Soviet Union began to believe that China had nuclear retaliatory capability. As for China, the threshold is higher: the deployed missiles should be operational. It took Chinese nuclear forces less than 20 years to achieve operability. So Chinese leaders were not confident until China's strategic missile forces gained independent launch capability without outside technical support in the mid-1980s.

China's special nuclear philosophy and nuclear posture of self-restraint is a great contribution to international security and global disarmament. In order to deter nuclear attack, a capability of 'assured destruction' is not necessary, nor is 'assured retaliation'. A small nuclear force that would create enough 'first strike uncertainty', making the other side not confident of a completely disarming strike, is adequate. All that this posture would require would be maintenance of a very small nuclear arsenal that would be de-alerted in peacetime, combined with mobility and concealment measures. China's experience demonstrates that strategic stability can be maintained at low numbers, and at low readiness. China's nuclear posture provides a model for deepcuts and the transition towards a nuclear weapons free world.

US ballistic missile defense (BMD) is a potential destabilizing factor in Sino-US strategic stability. Just as Chinese nuclear forces create uncertainty in US leaders' minds, reducing US confidence of a successful first strike, US BMD also creates uncertainty in Chinese leaders' minds, reducing Chinese confidence of nuclear retaliatory capability. In this article, we have identified first strike uncertainty thresholds for effective deterrence, with the absence of BMD. With the presence of BMD, the uncertainty threshold would become two-dimensional, representing offensive side and defensive side respectively. Up to now, we do not have enough historical evidence to determine a clear two-dimension threshold. Neither China nor US leaders know what this threshold would be. Therefore, US BMD will make Sino-US strategic relations more complicated, if not dangerous. Given the US attitude that it will not accept any limits on the capabilities and numbers of its BMD systems, the prospect of Sino-US strategic stability seems problematic.

It can be concluded from China's nuclear history that both proliferation optimists and proliferation pessimists are wrong. Nuclear proliferation could be stabilizing only if the first strike uncertainty created by a proliferator's nuclear program exceeds the threshold identified by this article. Before that, the situation is unstable, and the strong side would

face a high temptation to launch a disarming strike to get rid of the threat from the new proliferator. As mentioned above, the threshold is not high, but for a nascent nuclear-armed state, it is still highly demanding. In order to deter a nuclear disarming strike, a new proliferator should not only demonstrate its capability to detonate a nuclear device and to launch a nuclear missile, but also be able to build mobile missiles and take some measures to hide them.

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