

This article was downloaded by: [Rollins College]

On: 07 August 2014, At: 19:03

Publisher: Routledge

Informa Ltd Registered in England and Wales Registered Number: 1072954

Registered office: Mortimer House, 37-41 Mortimer Street, London W1T 3JH, UK



Journal of Strategic Studies

Publication details, including instructions for authors and subscription information:

<http://www.tandfonline.com/loi/fjss20>

The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations

Thomas J. Christensen^a

^a Director of the China and the World Program, Princeton University, Princeton, USA

Published online: 29 Aug 2012.

To cite this article: Thomas J. Christensen (2012) The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations, Journal of Strategic Studies, 35:4, 447-487, DOI: [10.1080/01402390.2012.714710](https://doi.org/10.1080/01402390.2012.714710)

To link to this article: <http://dx.doi.org/10.1080/01402390.2012.714710>

PLEASE SCROLL DOWN FOR ARTICLE

Taylor & Francis makes every effort to ensure the accuracy of all the information (the "Content") contained in the publications on our platform. However, Taylor & Francis, our agents, and our licensors make no representations or warranties whatsoever as to the accuracy, completeness, or suitability for any purpose of the Content. Any opinions and views expressed in this publication are the opinions and views of the authors, and are not the views of or endorsed by Taylor & Francis. The accuracy of the Content should not be relied upon and should be independently verified with primary sources of information. Taylor and Francis shall not be liable for any losses, actions, claims, proceedings, demands, costs, expenses, damages, and other liabilities whatsoever or howsoever caused arising directly or indirectly in connection with, in relation to or arising out of the use of the Content.

This article may be used for research, teaching, and private study purposes. Any substantial or systematic reproduction, redistribution, reselling, loan, sub-licensing, systematic supply, or distribution in any form to anyone is expressly

forbidden. Terms & Conditions of access and use can be found at <http://www.tandfonline.com/page/terms-and-conditions>

The Meaning of the Nuclear Evolution: China's Strategic Modernization and US-China Security Relations

THOMAS J. CHRISTENSEN

Director of the China and the World Program, Princeton University, Princeton, USA

ABSTRACT Will China's development of a new generation of nuclear weapons impact US-China security relations in important ways? One's answer depends on how one views the following: whether or not Chinese leaders believe that they are only now acquiring a secure second strike capability; the scope of coercive power that secure second strike capability provides to conventionally inferior actors; the meaning of China's 'No First Use' Doctrine; and the prospects for escalation control in future crises. Applying Cold War theories and tapping Chinese doctrinal writings this article concludes that China's nuclear modernization program might prove more consequential than is commonly believed.

KEY WORDS: US-China Relations, Nuclear Strategy, Deterrence Theory, Crisis Management

By modernizing and expanding its nuclear forces, China is developing the ability to strike the United States with dozens more nuclear weapons than it could in the past, putting at risk millions more US citizens. To most observers, this would seem very threatening to US national security, but from the more jaded perspective of certain deterrence theories developed during the Cold War, the change in China's nuclear posture may not amount to a fundamentally altered strategic challenge to the United States. After all, for three decades, China has had the ability to launch nuclear-tipped missiles at the continental United States, thereby killing millions of Americans. Moreover, the modernized Chinese nuclear force, like its smaller

A version of this article will appear in James W. Davis, ed., *Psychology, Strategy and Conflict: Perceptions of Insecurity in International Relations* (Oxford: Routledge, forthcoming 2012).

predecessor, will still be too limited in size and capabilities to constitute a threat to the massive US nuclear arsenal. Given the near certainty of US retaliation, China, even with a somewhat larger arsenal, will still have no incentive to launch nuclear weapons against the United States unless Washington were to launch a massive nuclear attack against China, an extremely unlikely event in any case. So, China's nuclear posture toward the United States now and in the foreseeable future seems to fit nicely with China's stated nuclear doctrines of 'minimal deterrence' and 'No-First-Use (NFU)' of nuclear weapons. So, the logic goes, China is merely upgrading its insurance policy against a massive nuclear first strike by the United States without gaining any new political leverage in the process.¹

Consistent with the view outlined above, the ongoing Chinese nuclear modernization drive indeed appears primarily designed to make China's arsenal more survivable against a first strike by adding not just numbers, but mobility to China's retaliatory force (mobile land-based missiles, and submarine launched ballistic missiles). Moreover, by switching from liquid to solid fuel, China's People's Liberation Army (PLA) reduces its response time in a nuclear crisis, making it harder for the United States or others to disable the Chinese retaliatory capability before it can be launched. This modernization is particularly important to Beijing not only because the United States enjoys massive nuclear superiority over China, but because Chinese strategists believe that advances in US conventional strike weapons and C4ISR (command, control, communications, computers, intelligence, surveillance, and reconnaissance) capabilities and a growing network of missile defense systems pose new challenges for the survivability of China's nuclear forces. No longer can Beijing dismiss the possibility of a US conventional first strike against China's nuclear weapons and/or command and control system.²

¹See Yao Yunzhu, 'China's Perspective on Nuclear Deterrence', *Air and Space Power Journal* (March 2010); Avery Goldstein, *Deterrence and Security in the Twenty-First Century: China, Britain, France, and the Enduring Legacy of the Nuclear Revolution* (Stanford UP 2000); also Taylor M. 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.

²Fravel and Medeiros, 'China's Search'; Michael S. Chase, Andrew S. Erickson, and Christopher Yeaw, 'Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States', *Journal of Strategic Studies* 32/1 (Feb. 2009), 67–114; and Brad Roberts, 'Strategic Deterrence Beyond Taiwan', in Roy Kamphausen, David Lai, and Andrew Scobell (eds), *Beyond the Strait: PLA Missions Other than Taiwan* (Carlisle Barracks, PA: Army War College Strategic Studies Institute 2009), ch. 6.

To the degree that Chinese nuclear modernization merely reduces the attractiveness of a US first strike on China – an unlikely scenario in any event – such modernization might add one additional layer of crisis stability while doing little to affect Washington’s ability to check assertive Chinese behavior toward the United States and its regional allies and partners at lower levels of violence. American optimists can take comfort in the fact that the United States enjoys and should continue to enjoy a high degree of conventional superiority over Chinese forces. Even though the United States has eschewed a No First Use policy of its own, Washington should be able to deter or respond to Chinese conventional challenges without resorting to the use of nuclear weapons. Moreover, some argue, Sino-American coercive diplomacy at the conventional level remains unaffected by China’s new nuclear capabilities because an escalation to the nuclear level in a conventional war is barred not only by Chinese publicly stated doctrines of No-First-Use, but, perhaps more important, by China’s own self-interests given the nuclear balance across the Pacific. By maintaining conventional superiority and nuclear superiority, then, the United States should expect no more challenges from the People’s Republic of China after the current nuclear modernization is complete than before it took place.³

This article will challenge the wisdom above by drawing on theoretical lessons from Robert Jervis’s path-breaking work on the role of nuclear second strike capability on deterrence during the Cold War. At the heart of this discussion is a key theoretical question that was hotly debated during the Cold War: does a second-strike capability in the hands of a conventionally inferior adversary provide that adversary significant coercive leverage in crises and conflicts at the conventional level. Many theorists at that time, particularly of the more hawkish variety, believed that US strategic nuclear forces were useful mainly or even exclusively as a check on Soviet nuclear attack against the United States and, to a lesser degree, its allies. Scholars such as Albert Wohlstetter and Colin Gray argued that strategic nuclear deterrence, to the degree it existed, was almost hermetically sealed from other levels of violence. So, even if the United States had enough retaliatory capability to prevent Soviet nuclear attack against the United States, the Soviets still could exploit advantages at the conventional level in full knowledge that the United States would be deterred from escalation to the nuclear level. Proponents of this ‘stability-instability’ paradox, a term coined by Glenn Snyder, argued

³For this logic, see Robert S. Ross, ‘Navigating the Taiwan Strait: Deterrence, Escalation Dominance, and U.S.-China Relations’, *International Security* 27/2 (Fall 2002), 48–85.

that the United States needed at least parity if not superiority at all levels of violence in order to check the Soviet Union, especially when providing 'extended deterrence' to US allies in Europe and elsewhere. They bemoaned the apparent Soviet conventional superiority in Europe, for example, as quite dangerous.⁴

Other theorists, most notably Robert Jervis and Thomas Schelling, used Chicken Games as a metaphor, arguing that once two states obtained a state of Mutually Assured Destruction (MAD), security relations became more a matter of balance of resolve, than a balance of power. MAD itself is a bit of a misnomer. For the politically relevant dynamics of MAD to exist, neither side needs to be able to decimate the other entirely. All that is necessary is that each side can level 'unacceptable damage' against the other, even after absorbing a full-scale first strike.⁵ As the leading scholars of nuclear deterrence and coercive diplomacy have long argued, such thresholds of acceptable pain are subjectively determined; the question is not simply how much objective physical destruction the responding country can level in a retaliatory second strike, but whether or not the predicted level of destruction is considered 'acceptable' to the target.⁶

Adopting this version of a MAD concept, Jervis in particular argued that a secure second-strike nuclear capability against the Soviets provided the United States with an effective broad spectrum deterrent in Central Europe, to include prevention of aggression at levels far below the strategic nuclear threshold. He asserted that this condition held even when and where the Soviets enjoyed conventional superiority or superiority at the tactical and theater nuclear levels. Jervis employed Schelling's concept of 'the threat that leaves something to chance', arguing that the Soviets could never rest assured that a conventional war would not escalate to the strategic nuclear level. The forward deployment of US conventional forces, tactical nuclear weapons and

⁴Glenn Snyder, 'The Balance of Power and the Balance of Terror', in Paul Seabury (ed), *The Balance of Power* (San Francisco, CA: Chandler Publishers 1965), 184–201; Henry Rowen and Albert Wohlstetter, 'Varying Responses with Circumstances', in Jonathan Holst and Uwe Nerlich (eds), *Beyond Nuclear Deterrence: New Aims, New Arms* (New York: Russak 1977), 225–38; Colin Gray 'Strategic Stability Reconsidered', *Survival* 109/4 (1980), 135–54. For a review of this literature, see Robert Jervis, *The Meaning of the Nuclear Revolution, the Prospect of Armageddon* (Ithaca, NY: Cornell UP 1989), ch. 1.

⁵For different versions of MAD, all of which share this basic conceptual foundation, see Jervis, *Meaning of the Nuclear Revolution*, ch. 3. Also see Thomas Schelling, *Arms and Influence* (New Haven, CT: Yale UP 1967), 18–25.

⁶For such US calculations during the early 1960s, see Jervis, *The Meaning of the Nuclear Revolution*, 103; and Fred Kaplan, *The Wizards of Armageddon* (Stanford UP 1983), 294–306.

theater nuclear weapons in Europe, even if smaller in number than their Soviet counterparts, would create an obvious slippery slope toward strategic nuclear war that would prove sufficient to give the Soviets's pause before they tried to exploit any alleged advantage against the United States and its NATO allies at lower levels of violence. This was particularly true since any Soviet aggression in Europe would be an attempt to alter the recognized status quo, a situation which students of psychology, such as Jervis, believe should strongly favor the defender over the attacker in terms of relative levels of resolve to run risks, fight wars, and pay heavy costs in those wars.⁷

The United States now faces a conventionally inferior potential adversary with nuclear weapons, so the hawkish and dovish logics of the Cold War, somewhat ironically, are turned on their heads in the post-Cold War world. China's military modernization over the past two decades has produced an array of new conventional capabilities that, for the first time, pose a serious coercive challenge to forward deployed US forces in the Western Pacific. But it is still fair to say that the United States enjoys broad spectrum conventional military superiority over China. So, a contemporary application of the 'stability-instability paradox' might suggest that the acquisition or maintenance of a Chinese second strike should prove immaterial to the United States because the United States maintains such conventional superiority and Chinese nuclear retaliatory capabilities can only deter a US nuclear strike against China, not US conventional operations. This is particularly true, if, as Robert Ross has argued, Chinese elites believe in the stability-instability paradox and clear firebreaks between conventional and nuclear conflict.⁸ In other words, and somewhat ironically, a relatively calm reaction to contemporary Chinese nuclear modernization in the United States requires ascribing to the Chinese a relatively hawkish view of Cold War deterrence challenges for the United States vis-à-vis the Soviet Union. Ross's argument is tightly logical but depends on assumptions about Chinese attitudes regarding nuclear deterrence that, as we will see below, may not be valid.

In this article, I will call into question any unalloyed optimism about the meaning of China's evolving nuclear arsenal. The four lines of argumentation relate directly to Jervis's Cold War theories. Whenever possible, I will support the arguments by referring to newly available doctrinal works in China regarding conventional and nuclear deterrence.

⁷Schelling, *Arms and Influence*, 98–9; Robert Jervis, *The Illogic of American Nuclear Strategy* (Ithaca, NY: Cornell UP 1984), 137–40; idem, *Meaning of the Nuclear Revolution*, 21–2, and 81–5.

⁸Ross, 'Navigating the Taiwan Strait', 60.

First, given the small number and high vulnerability of China's traditional nuclear forces, we cannot be sure that Beijing's elites believed they had an effective 'second strike' or retaliatory capability in recent years. In other words, in the minds of China's top leaders, China may be acquiring a secure second strike capability for the first time or recovering one it lost after the United States developed new strike capabilities since the 1980s. If true, Chinese leaders might be more bold in conventional crises with the United States than they otherwise would be, knowing that China is at least capable of countering any American threat of nuclear escalation if a strong response is made to China's conventional military actions.

Second, even if Chinese leaders are simply upgrading their second strike capability from an older version to a newer version, Chinese second strike capabilities may matter for the first time in US-PRC (People's Republic of China) crisis management. China is developing new conventional military capabilities designed to assert or protect the PRC's interests in its maritime periphery in ways that greatly increase the chance of conventional engagement with US forces, something China was previously largely incapable of doing in an effective manner. While the United States would still enjoy conventional superiority at air and at sea in an all-out confrontation, Beijing is developing coercive conventional options designed to delay or deter effective US intervention in support of Taiwan or other regional actors by raising the potential costs of US intervention. In other words, since in previous years a conventional conflict itself seemed harder to imagine, the relationship between a perceived second-strike capability and coercive diplomacy at the conventional level was less important to ponder.

Third, the lack of agreement over the legitimate status quo in maritime Asia makes the region potentially more volatile than the Central European theater during the Cold War. China has expansive maritime claims in the South and East China Sea (Taiwan, Paracels, Spratlys, and Diaoyu/Senkaku islands), many of which date back to the 1930s and thereby hardly seem new or revisionist in Chinese thinking. But these claims are contested throughout the region and any effort by China to enforce the claims by military means would almost certainly look revisionist to many regional actors and to many Americans. In a sense then, from the perspective of political psychology we may be facing the worst combination of factors: both sides in a dispute may stand particularly firm because each believes sincerely that it is defending the status quo against revisionists and that the other side should therefore back down.

Fourth, in order to adjudicate between the relative persuasiveness of arguments about stability based on 'the stability-instability paradox' and arguments about instability based on the 'threat that leaves something to

chance,' we need to be able to assess the robustness of firebreaks between the conventional and nuclear level and the plausibility of scenarios for escalation from conventional conflict to nuclear conflict. Such escalation can happen in two ways. First, fighting can become blurred between conventional and nuclear war in ways that were made likely in Europe by the forward deployment and integration of tactical and theater nuclear weapons with NATO conventional war-fighting assets. One might argue that it seems somewhat contradictory to argue that a country has a secure second strike at *time t* and might therefore be emboldened by that fact politically in a conventional crisis, but that it might become concerned about the sustainability of that deterrent in the course of war-fighting at the sub-strategic level at *time t plus 1*. There is a tension here but no contradiction. Secure second strike is really the ability to survive a bolt-out-of-the-blue massive enemy strike against one's nuclear forces and still level unacceptable damage on the enemy with one's own nuclear forces. It does not necessarily posit that the same state can or will stand idly by while its key strategic assets, including relevant weapons and command and control systems are degraded during a conventional or tactical nuclear war. A second and perhaps somewhat less inadvertent road from conventional to nuclear war can occur if conventional strikes by the enemy are deemed themselves to be threatening unacceptable damage to the state's core national interests and therefore might warrant either the threat of nuclear retaliation or actual nuclear retaliation as a means to dissuade the enemy from continuing to launch those devastating conventional strikes. In a sense, the British and French independent nuclear forces may have played such a role during the Cold War in helping to deter conventional Soviet aggression in Europe.

Unfortunately, in the case of China, one can imagine both roads to escalation in wartime in ways that may lend credibility to China's nuclear coercion in conventional crises. One major problem is that China is simultaneously developing conventional and nuclear coercive capabilities that overlap significantly. Future war-fighting with some of the key weapons systems in this conventional modernization drive – especially submarines and conventionally-tipped missiles – could rather easily blur the lines between conventional and nuclear war in a Sino-American conflict (since missiles and submarines are also the backbone of China's nuclear deterrent). For example, if strikes by the United States on China's conventional coercive capabilities or their critical command and control nodes and supporting infrastructure were to appear in Beijing as a conventional attack on its nuclear retaliatory capability or as a precursor to a nuclear first strike, even a China that generally adheres to a No-First-Use posture might escalate to the nuclear level. Moreover, China might simply soften or scrap its adherence to a No First Use principle under various extreme

circumstances in a conventional war. If this were to occur, no one could deny that China's ability to deliver a larger number and wider variety of nuclear weapons against US targets would be quite consequential indeed for US national security.

Key to answering all these questions is China's own views about nuclear deterrence. The attitudes of top leaders about nuclear weapons are closely held in most capitals, and Beijing is certainly no exception. But we do have some windows into China's nuclear thinking, including one important 2004 doctrinal book for China's rocket force, the Second Artillery of the People's Liberation Army, which recently has become available outside of the PRC.⁹ The lessons drawn here from that book suggest that the same factors that made Jervis relatively relaxed about Soviet Cold War military developments in the 1970s and 1980s, should make US strategists more concerned about Chinese developments today. On the positive side, in general, this work and others are largely consistent with China's publicly stated 'No First Use' Doctrine. But sections of the book suggest that No First Use is sometimes vaguely defined and that the conventional and nuclear levels could easily become blurred in a shooting war between the United States and China if, for example, Beijing perceived that the United States was seeking to destroy China's retaliatory capability with conventional weapons. Moreover, one section of the book also explicitly discusses other extreme conditions during conventional war that might warrant 'adjusting the nuclear deterrence threshold' (or 'adjusting nuclear policy') in a way that makes China's NFU Doctrine seem more of a guideline than a rule.

China's Nuclear Modernization: Revolution or Evolution?

China's 2006 Defense White Paper argues that the purpose of China's nuclear forces all along has been to 'deter other countries from using or threatening to use nuclear weapons against China' and subsequently, China 'upholds the principles of counterattack in self-defense and limited development of nuclear weapons'.¹⁰ The 2008 Defense White

⁹Yu Xijun (ed), *Di Er Pao Bing Zhanyi Xue* [The Science of Second Artillery Campaigns, hereafter SSAC] (Beijing: PLA Press 2004). This fascinating doctrinal volume has become available from Chinese language booksellers outside of the PRC and is also available at libraries at George Washington University, Harvard University, and Oxford University, and the US Naval War College. To my knowledge, it was first cited publicly in 2009 in Roberts 'Strategic Deterrence Beyond Taiwan', and Chase, Erickson, and Yeaw, 'Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States'.

¹⁰China's National Defense in 2006, People's Republic of China, PRC Information Office of the State Council 2006.

Paper similarly notes: ‘China remains committed to the policy of no first use of nuclear weapons, pursues a self-defensive nuclear strategy, and will never enter into a nuclear arms race with another country.’¹¹ In line with this declaratory doctrine, China developed the capability to level significant nuclear destruction against the US homeland in the early 1980s. In 1980 China tested and then, in the following year, deployed its first missile capable of delivering a nuclear warhead to the continental United States;¹² eight years later, China conducted its first successful submerged test launch of the JL-1 Submarine Launched Ballistic Missile (SLBM), a system that was 24 years in the making.¹³ Although China had nuclear weapons capable of attacking forward deployed US bases since the late 1960s, these systems were the first to be able to strike the US homeland. Table 1 details the publicly available information about the current Chinese nuclear and conventional missile arsenal, with the longer range missiles – CSS-2, CSS-3, DF-5 (CSS-4), DF-31, DF-31A, and some portion of the DF-21 (CSS-5) – likely making up the bulk of those tipped with nuclear weapons (the nuclear capable JL-2 submarine launched ballistic missile is under development but has experienced test failures).¹⁴ In the early 1980s, as the Chinese deployed the liquid fueled CSS-3 and CSS-4, capable of reaching American targets, the good news for the Sino-American relationship at that time was that both countries were in active opposition to the Soviet Union and even cooperated in that effort in important ways, particularly in Afghanistan and in China’s Northwest regions. Since even conventional war between the two partners was extremely unlikely at that time, one did not need to worry much about nuclear attacks against the other as either a conscious decision of either capital or as a result of inadvertent escalation from the conventional to the nuclear level.

Mutually Assured Destruction in US–China Relations

After the end of the Cold War, the United States and the PRC lost this common mission and new difficulties began to arise regarding

¹¹China’s National Defense in 2008, People’s Republic of China, PRC Information Office of the State Council 2008.

¹²See Dominic Descioli, ‘China’s Space Development and Nuclear Strategy’, in Lyle J. Goldstein and Andrew S. Erickson (eds), *China’s Nuclear Force Modernization* (Newport, RI: Center for Naval War Studies 2005), 49–64 at 52.

¹³Christopher McConaughy, ‘China’s Undersea Nuclear Deterrent: Will the US Military be Ready?’ in Goldstein and Erickson (eds), *China’s Nuclear Force Modernization*, 23–48, at 29.

¹⁴Department of Defense, Office of the Secretary of Defense, Annual Report to Congress on the Military Power of the People’s Republic of China, 2010, 34.

Table 1. China's Missile Force

China's Missile Inventory (NATO/PRC designator)	Ballistic and Long-Range Cruise		
	Missiles	Launchers	Estimated Range
CSS-2/DF-3, DF-3A	15–20	5–10	3,000+ km
CSS-3/ DF-4	15–20	10–15	5,400+ km
CSS-4/DF-5	20	20	13,000+ km
DF-31	< 10	< 10	7,200+ km
DF-31A	10–15	10–15	11,200+ km
CSS-5/DF-21	85–95	75–85	1,750+ km
CSS-6/DF-15	350–400	90–110	600 km
CSS-7/DF-11	700–750	120–140	300 km
DH-10	200–500	45–55	1,500+ km
JL-2	Developmental	Developmental	7,200+ km

Source: Department of Defense, Office of the Secretary of Defense, *Annual Report to Congress on the Military Power of the People's Republic of China*, 2010, 66. DF is shorthand for 'Dongfeng' and is a designator for land-based ballistic missiles, JL is shorthand for 'Julang' and is a designator for submarine-launched ballistic missiles. DH is shorthand for 'Donghai' and is a designator for a cruise missile system.

differences over relations across the Taiwan Strait. But the nuclear capabilities that China had developed during the Cold War era did not seem to figure prominently into US–China strategic calculations in the 1990s. Given the massive US nuclear arsenal and continuing US nuclear superiority, it was difficult for American elites to see how Chinese leaders would ever have an incentive to use China's arsenal against the United States in anything but a retaliatory manner. As then Assistant Secretary of Defense Joseph Nye articulated in 1995; 'If deterrence prevented 10,000 Soviet missiles from reaching the United States, it baffles me as to why it wouldn't prevent 20 Chinese missiles from reaching Alaska.'¹⁵ What was true for the 20 or so missiles of more limited range in 1995, perhaps, should still hold true for the 200 or so weapons of longer range that independent experts are forecasting for the upgraded Chinese arsenal, even as the United States reduces its own to 5,000 warheads overall and 2,200 operational warheads (see Table 1 below).¹⁶ The basic condition of 'Mutually Assured Destruction'

¹⁵Nye quoted in Goldstein with Erickson, *China's Nuclear Force Modernization*, 3.

¹⁶Kier Lieber and Daryl Press go much further and assert that the smaller US arsenal provides the United States itself a credible first strike against China, see Kier A. Lieber and Daryl Press, 'The Nukes We Need: Preserving the American Deterrent', *Foreign Affairs* 88/11 (Nov./Dec. 2009), 39–51.

(MAD) between the United States and China would not have changed and Beijing would have no notable new capability or incentive to launch a first strike designed to cripple US retaliatory capability.¹⁷ In other words, even a reduced, but hefty US arsenal should easily have the capacity to deter any foreseeable offensive threat from Chinese nuclear weapons, regardless of how many resources China devotes to modernizing its arsenal.¹⁸

One key question regarding Sino-American MAD, however, is not whether China can break out of it, but whether or not it previously enjoyed a secure second strike at all. Given American superiority and the backwardness of China's nuclear arsenal, US leaders might have had and might still have the capability to wipe out China's nuclear retaliatory capability in a bold first strike. But what is more important for coercive diplomacy is not the physical US capabilities but how they are viewed in China. If Chinese leaders privately viewed the balance in this way, this might have made them even more cautious than they otherwise would be in creating crises or conventional conflicts with the United States. Some Chinese strategists and US strategists alike believe that advances not only in the accuracy and power of the US nuclear arsenal, but also an array of new and quite lethal conventionally tipped strike weapons, guided by significant advances in US C⁴ISR (Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance) capabilities, might have rendered the traditional Chinese arsenal a tempting and vulnerable target for the United States in a dire military crisis. Moreover, the multi-layered missile defense system that the United States is developing might have provided a bit of added insurance against Chinese retaliation if only a small number of Chinese missiles were to survive unscathed in the first strike itself.¹⁹ In theory, of course, this safety net could have provided a further temptation for a US President to launch a first strike against China. In this one sense, if anything, the larger, more mobile, more penetrating, and more easily fired Chinese nuclear arsenal under

¹⁷On the basic concept of Mutually Assured Destruction and varying arguments about the condition's significance for international security, see Jervis, *Meaning of the Nuclear Revolution* and Snyder, 'The Balance of Power and the Balance of Terror'.

¹⁸Kingston Reif, 'Nuclear Weapons: The Modernization Myth'. *The Bulletin of the Atomic Scientists Online*, 2009, <www.thebulletin.org/web-edition/features/nuclear-weapons-the-modernization-myth>.

¹⁹For an analysis of improving US first strike options, see 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; and idem, 'The Nukes We Need.' For Chinese concerns about the development of US first strike options and missile defenses, see Yao, 'China's Perspectives.'

development might remove a potential source of crisis instability by making even less attractive a US first strike attempt against China.

There are objective reasons for Chinese strategists to have worried that the older generation of immobile Chinese nuclear missiles might have appeared to be vulnerable in a crisis, especially because of potentially long lead times for launch. According to published reports, before firing the missiles Chinese military personnel would have needed to add liquid fuel and mate missiles with warheads, a process that could take hours.²⁰ According to Paul Godwin, China embarked on the modernization of its strategic forces in the early 1980s 'to replace its inaccurate, unreliable, slow-responding liquid-fueled weapons with tactically mobile, more accurate, quicker-responding solid-fueled systems.'²¹ Earlier in this decade, the US intelligence community also predicted that by 2015 most of China's missiles will be road mobile.²² Particular attention has been paid to China's new and growing arsenal of DF-31A long-range missiles, the first road-mobile, solid-fueled Chinese missile system able to range the entire United States.²³ The credibility of China's nuclear deterrent should increase significantly with this transition from liquid-fueled to solid-fueled missiles and from fixed-basing to mobile-basing, and with the development of a robust C4I infrastructure.²⁴ In an excellent recent *International Security* article Taylor Fravel and Evan Medeiros agree with Godwin and support with careful research the contention that the main goal of Chinese modernization efforts has been to secure a second strike capability necessary for assured retaliation, which deters the adversary from launching a nuclear first-strike against China by credibly

²⁰According to publicly available analyses, the missiles of the second artillery have traditionally been kept neither fueled (the liquid is corrosive after 24 hours; the liquid propellant is kept in tanks nearby) nor mated with nuclear warheads. These sources assert that the process of loading the fuel and installing warheads can take as many as four hours. See Bates Gill, James Mulvenon and Mark Stokes, 'The Chinese Second Artillery Corps: Transition to Credible Deterrence', in James Mulvenon and Andrew N.D. Yang (eds) *The People's Liberation Army as an Organization: Reference Volume v1.0*. (Santa Monica, CA: RAND Corporation 2001), 510–86. For Chinese official sources acknowledging the delay associated with liquid fueling; see 'China develops first solid-fuel launch vehicle,' *Xinhua News Agency*, 24 Sept. 2003.

²¹Paul H.B. Godwin, 'Potential Chinese Responses to US Ballistic Missile Defense' (2002), <www.stimson.org/china/pdf/CMDWP3.pdf>, 63.

²²National Intelligence Council, *Foreign Missile Developments and the Ballistic Missile Threat Through 2015*, (2001), 8.

²³Military and Security Developments Involving the People's Republic of China 2010, 7; Federation of American Scientists, 'DF-31,' <www.fas.org/nuke/guide/china/icbm/df-31.htm>.

²⁴Gill, Mulvenon and Stokes, 'The Chinese Second Artillery Corps', 556.

threatening a Chinese nuclear retaliatory nuclear strike that would level unacceptable damage against the enemy.²⁵

Despite the huge numerical advantage of US nuclear forces over Chinese ones,²⁶ by the standard of most American deterrence theorists the PRC and the United States might have been in a state of Mutually Assured Destruction (MAD), properly and technically defined, since the early 1980s at the very latest. Even though China as a nation could be thoroughly destroyed by the massive US arsenal, in attempting a crippling preemptive strike against China the United States would have to run a real risk that China could respond with at least some nuclear retaliation against high value US targets.²⁷ This is reminiscent in some ways to the 'force de frappe' that France maintained vis-à-vis the Soviet Union during the Cold War. Political scientists Avery Goldstein and Devin Hagerty argue that for effective conditions of Mutually Assured Destruction to hold, a state might only need to field an arsenal that provides its potential adversary 'first-strike uncertainty' or the fear that its first strike will be unsuccessful in destroying all of the target state's retaliatory capability. Even if the United States could conceivably pull off a successful bolt out of the blue attack on China, crippling its ability to retaliate by disabling its missiles, its command and control, or both, practically and politically speaking MAD still might be a robust condition because US leaders would have to multiply the chance, however small, that the first strike might not work as planned by the extremely high costs of a devastating nuclear response against high value US targets, a negative utility function that might still prove very high indeed.²⁸

By the technical definition offered above, from an American standpoint the Sino-American relationship could have been one of

²⁵Fravel and Medeiros, 'China's Search for Assured Retaliation', 79.

²⁶China currently has approximately 200 warheads, the US has 10,000; by 2015 after the US has completed reductions, China may have 220 warheads and the US 5,000. Furthermore, China has traditionally had only 20 ICBMs that can reach the US, none on alert; the US has more than 830 missiles that can reach China, most ready to launch within minutes. See Hans M. Kristensen, Robert S. Norris, and Matthew G. McKinzie, 'Chinese Nuclear Forces and US Nuclear War Planning', (Federation of American Scientists/Natural Resources Defense Council, November 2006), <www.fas.org/nuke/guide/china/Book2006.pdf>, 2.

²⁷Along these lines, a RAND study on Chinese nuclear modernization 'China's minimal deterrent was primarily psychological, though the potency of this aspect of the deterrent should not be underestimated.' See Gill, Mulvenon, and Stokes 'The Chinese Second Artillery Corps', 556.

²⁸Devin T. Hagerty, 'Nuclear Deterrence in South Asia: the 1990 Indo-Pakistani Crisis', *International Security* 20/3 (Winter 1995-96), 70-114; and Goldstein, *Deterrence and Security in the 21st Century*, 58-61.

MAD even before it had missiles that could reach the United States. One reason is that in at least certain circumstances, China's previous ability to strike US regional allies in Asia and/or US forward deployed bases on Japan, Korea, etc. might have been seen as an unacceptable cost for a US leadership to pay.²⁹ Moreover, one might find it difficult to imagine the circumstances under which a US President would launch a massive nuclear first strike against China, even if he or she felt like the United States had absolutely certainty that the strike could destroy all of the nuclear weapons in China. The moral horror of massive Chinese casualties, and the reputational costs to the United States might themselves deter such an action under all but the most dire of circumstances for the United States and its forward deployed forces.

At a fundamental level, then, it is hard to dispute this basic logic about the importance, or lack thereof, of China's nuclear modernization from a small, backward but still formidable nuclear force to a more sophisticated one of larger, but still quite limited size. To the degree that the United States may already have been deterred from launching a crippling first strike, China's modernization of its nuclear force, to include improved survivability and reliability of its second-strike systems, may only solidify an existing reality. As such, it could not be seen as a revolutionary change in US–China strategic relations.

The Potential Dangers of China's Nuclear Modernization: Why MAD Could be Bad

Despite the *prima facie* persuasiveness of the logic offered above, I believe it would be incorrect to dismiss the changes in China's nuclear arsenal as unimportant. The existing literature on nuclear deterrence and coercive diplomacy provide two reasons to be more cautious. First, while US security analysts might see nothing revolutionary in the current and projected Chinese nuclear developments, we cannot be sure that relevant Chinese officials share those views. Since Chinese perceptions, not objective power balances, will matter most, determining how Chinese elites have thought about Beijing's nuclear deterrent is arguably more important than performing a net assessment of relative

²⁹According to publicly available analyses China has approximately 20 liquid-fueled limited range CSS-3 ICBMs which are primarily directed at targets in Russia and Asia; between 15 and 20 liquid-fueled CSS-2 intermediate range ballistic missiles (IRBMs); and possesses about 50 CSS-5 road mobile, solid-fueled MRBMs, which are relevant for regional deterrence missions.³⁰ Department of Defense, 'Annual Report to Congress', 2008, 24.

nuclear forces across the Pacific. In coercive diplomacy perceptions are all important; this applies both to the United States and to China.

Chinese elites have reportedly expressed real doubts that China enjoyed a sufficiently robust second strike capability and/or would continue to enjoy one without significant modernization given advances in US missile defenses and strike weapons.³⁰ In 2011 knowledgeable Chinese interlocutors told me that relevant Chinese military elites did not believe they had a secure second strike in the past and believe they are only now acquiring such a capability.³¹ Chinese leaders might feel that, because of the recent modernization, for the first time Beijing will really enjoy a secure second strike capability, as experts like Brad Roberts, Michael Chase, Andrew Erickson, Robert Ross, Kier Lieber and Daryl Press have all asserted.³² As Christopher Yeaw, Chase and Erickson state, 'China appears to be on the verge of reconciling the previously significant divergence between the Second Artillery's once largely aspirational doctrine and its actual capabilities.'³³ The aforementioned PLA doctrinal work raises concerns about various forms of both nuclear and conventional first-strike threats to China's nuclear capabilities, including precision guided munitions and electronic warfare, and urges the reduction of the time that the Second Artillery requires to respond to attack.³⁴ Yeaw, Chase and Erickson posit that the qualitative change in the composition of China's nuclear forces was designed in part to 'enhance survivability in the face of modern precision warfare.'³⁵ Brad Roberts asserts that Chinese leaders' concern about vulnerability of the nuclear deterrent to US precision strike capabilities, demonstrated as very effective as early as the First Gulf War in 1991, dates back to the Jiang Zemin era.³⁶ As Admiral Liu Huaqing of China's Central Military Commission reportedly admitted in the 1990s when advocating for a sea-based nuclear deterrent, 'Fewer than 10 percent of China's land-based

³⁰CSIS, IDA, RAND Corporation, 'CFISS Conference on US-China Strategic Nuclear Dynamics' (2006), <www.comw.org/cmp/fulltext/0606uschinaconf.pdf>.

³¹Discussions with Chinese experts in Beijing and Shanghai, May 2011.

³²Brad Roberts, 'China-US Nuclear Relations: What Relationship Best Serves US Interests?' Institute for Defense Analysis 2001, Institute for Defense Analyses, <www.au.af.mil/au/awc/awcgate/dtra/china_us_nuc.pdf>; Chase and Erickson 'An Undersea Deterrent,' 2; Ross, 'Navigating the Strait,'; and Lieber and Press, 'The End of MAD.'

³³Chase, Erickson, and Yeaw, 'Chinese Theater and Strategic Missile Force Modernization', 74.

³⁴SSAC, 299, and 303.

³⁵Chase, Erickson, and Yeaw, 'Chinese Theater and Strategic Missile Force Modernization', 94.

³⁶Roberts, 'Strategic Deterrence Beyond Taiwan', 181-2.

missiles would survive a large-scale nuclear first strike; the less vulnerable SLBMs would preserve our nuclear counterattack capabilities.³⁷ But given the timelines for Chinese modernization concerns about the credibility of the deterrent are likely even more deeply rooted, dating back to discussions in the United States about developing missile defenses during the Reagan administration. When one adds subsequent developments in missile defenses to the development of other conventional US capabilities, then perhaps, without modernization, China would end up with little or no retaliatory capability. For example, some in China think that the nuclear-powered ballistic missile firing submarines (SSBNs) now under development are valuable precisely because they will be more capable than land-based missiles at penetrating US missile defenses.³⁸

At a joint conference on US-China nuclear issues, Chinese experts also articulated a concern that the US would tailor its nuclear forces to negate China's second-strike capability, a concern that arose partly due to advances in US missile defenses and non-nuclear strike capabilities.³⁹ As then Senior Colonel (now Major General) Yao Yunzhu puts it most plainly, 'to keep the arsenal effective, China has to modernize it to ensure credibility after a first nuclear strike'.⁴⁰ Lest this seem like pure paranoia in China, scholarly writings in the United States by Kier Lieber and Daryl Press go much further still, suggesting that improvements in the accuracy and lethality of US nuclear weapons may have negated MAD not only in relation to China's small traditional arsenal, but even Russia's much more expansive arsenal! They also posit that the United States might be able to disable the traditional Chinese arsenal with very few casualties (only 700!) because of the reduced fallout involved in using smaller and more accurate bunker-busting weapons, thus potentially reducing the self-deterrence aspects of nuclear warfare, discussed above, that a future president might face.⁴¹ Chinese elites' expressed concern about a potential first strike might still seem disingenuous to some Americans who cannot imagine us actually launching such an attack on China, but it is the primary job of all nations' strategic forces to preserve survivability in

³⁷Admiral Liu Huaqing in a nonattributed quote in US Department of the Navy, Office of Naval Intelligence. *Worldwide Submarine Challenges*, 1997, 1.

³⁸Wang and Ye cited in Michael S. Chase and Andrew S. Erickson, 'An Undersea Deterrent?', *Proceedings* 135/6 (2009), <www.usni.org/magazines/proceedings/story.asp?STORY_ID=1907>.

³⁹CSIS, IDA, RAND Corporation Conference on US-China Strategic Nuclear Dynamics 2006.

⁴⁰Yao, 'China's Perspective', 2.

⁴¹Lieber and Press, 'The End of MAD?'; and Lieber and Press, 'The Nukes We Need'.

wartime environments. Moreover, this is hardly a unique Chinese obsession. One only has to observe how obsessive US leaders were in producing a robust nuclear triad against the Soviets, complete with redundant command and control systems, to deduce that American leaders in Chinese shoes would not have accepted a second strike capability of 20 liquid fueled intercontinental ballistic missiles, especially given the significant conventional and nuclear superiority of the United States.⁴²

If true, the change from a vulnerable Chinese retaliatory nuclear force to a more secure one could have implications for future Sino-American strategic interactions that are not just theoretically interesting, but also practically quite important. On the pessimistic side of the equation, Chinese leaders might become much bolder in defending their perceived regional interests in the face of resistance by the United States and regional US allies and security partners than they have been in the past. This would be particularly true if China's aggressive behavior at the conventional level was launched in order to defend what Chinese elites sincerely believed to be the legitimate status quo. Viewed more optimistically, with a strengthened nuclear deterrent, Chinese leaders might now feel significantly more secure about political and conventional military developments in the region and across the Pacific and thereby less nervous about small changes in these trends in a negative direction. Either way, if the eventual deployment of the current systems under development were to give Chinese elites the impression for the first time that they enjoy a MAD relationship with the United States this could prove a major factor in US-China security relations. Whether it does or not will depend in large part on how Chinese elites theorize about the meaning of MAD for the strategic interactions of two nuclear-armed states.

Competing Visions of MAD and the Contemporary Case of China

One of the key debates during the Cold War was about the meaning of MAD, or as Jervis put it in his seminal study, 'the meaning of the nuclear revolution'. That revolution started not in 1945, but rather when the two superpowers established a condition of Mutually Assured Destruction later in the Cold War. Some theorists and advisors saw MAD as a condition that only provided the United States and, by

⁴²For US obsession with secure nuclear forces and secure command and control for those forces, see Kaplan, *Wizards of Armageddon*, and Stephen Polk, 'China's Nuclear Command and Control,' in Goldstein and Erickson, *China's Nuclear Force Modernization*, 7–22, at 8.

corollary, the Soviet Union, protection against a massive preemptive strategic nuclear attack by the enemy, but left open the possibility of exploitation at lower levels of violence by a superior foe (for some to include only conventional warfare, for others, conventional and lower-level nuclear warfare). Glenn Snyder coined the phrase ‘stability-instability paradox’ to sum up the concerns of those who believed that the shadow of nuclear deterrence was rather limited in size and that, therefore, the United States needed to seek countervailing conventional and even tactical nuclear superiority over the Soviets to deter Soviet aggression, especially against US friends and allies, for the sake of whom the United States could not credibly threaten its own survival.⁴³

Others, like Jervis, saw the stabilizing implications of MAD as much more robust for defending the status quo by deterring Soviet aggression, not only against the United States but also against key US friends and allies. By this logic, revisionist conventional challenges to the interests of any nuclear power with a secure second strike capability would be extremely risky because there would be no guarantee that conflict at lower levels of violence would not escalate to the nuclear and even strategic nuclear level, perhaps inadvertently, once the fog of war descended on the belligerents. Borrowing from Schelling’s seminal work on coercive diplomacy, Jervis asserted that, under conditions of MAD, even an actor that is inferior in the conventional and sub-strategic nuclear levels can deter aggression against its national interests by deploying Schelling’s ‘threat that leaves something to chance’. In this case that chance would be the prospect that conventional war would unleash escalatory forces that were beyond the complete rational control of the relevant actors when the escalation process first began.⁴⁴

These debates were not just academic – they had serious implications for US defense requirements in Europe and elsewhere and for US defense budgets. The budgets were as high as they were in part because planners across administrations seemed to disagree with Jervis’s reasoning. Jervis labeled ‘illogical’ this less optimistic mainstream thought among US defense planners, who insisted on a ‘countervailing strategy’ in which the United States pursued war-fighting capacity, and if possible, superiority at all imaginable levels of violence. According to Jervis, US doctrine ignored some of the revolutionary strategic implications of MAD and was at best wasteful of US resources and, at worst, strategically destabilizing. Many Cold War hawks, even those who accepted the

⁴³Snyder, ‘The Balance of Power and the Balance of Terror’; Rowen and Wohlstetter, ‘Varying Responses with Circumstances’; Gray, ‘Strategic Stability Reconsidered’. For a review of this literature, see Jervis, *The Meaning of the Nuclear Revolution*, ch. 1.

⁴⁴Schelling, *Arms and Influence*, 98–9; Jervis, *The Illogic*, 137–40; Jervis, *The Meaning of the Nuclear Revolution*, 21–2, and 81–5.

strategic importance of mutual second strike capability, countered that US conventional and tactical inferiority left US allies, especially in Europe, vulnerable to Soviet intimidation and invasion at the sub-strategic level.⁴⁵ No pacifist, Jervis advocated a series of forward deployed conventional, tactical, and theater nuclear forces that would prevent quick and easy Soviet victories and would create a slippery slope toward escalation to the strategic level if the Soviets were to challenge US and allied defenses conventionally or with tactical nuclear weapons.⁴⁶ His prescriptions were expensive and potentially provocative to the Soviets, but, he believed, less so on both scores than actual US strategy.

Those arguing for the broad view of MAD's deterrent power often tapped into the findings of the psychological literature on prospect theory, most famously associated with Nobel Prize Winning psychologists Amos Tversky and Daniel Kahneman.⁴⁷ One of the theory's basic psychological intuitions, borne out in experimental laboratories, is that most people in most settings value what they believe they already have much more intensely than what they covet. This same phenomenon can help us understand why in Schelling's argumentation about coercive diplomacy, deterrence – the use of threats and assurances in combination to prevent a change in the accepted status quo – is easier than compellence, the use of threats and assurances in combination to change the perceived status quo. Compellence and deterrence are otherwise quite similar; they both require a mix of clear and credible signals about the high likelihood of punishment if the target does not comply with the demand (threat), and the high likelihood that punishment will not be forthcoming if the target complies with the demand (assurances).⁴⁸ One key difference between the two types of coercive diplomacy is that the status quo is psychologically and therefore politically robust, and all things being equal in a relationship of coercive diplomacy, the party

⁴⁵Jervis argued stridently against those advocating massive conventional arms racing in Europe and especially so against those who prescribed a push for US superiority at all levels of nuclear violence. Jervis, *The Illogic*.

⁴⁶Jervis, *The Illogic*, ch. 6.

⁴⁷Jervis, *The Meaning of the Nuclear Revolution*, 168–73. For the original theoretical work, see Amos Tversky and Daniel Kahneman, 'Prospect Theory: An Analysis of Decision under Risk,' *Econometrica* 47/2 (March 1979), 263–91. For interesting applications of the theory to international relations, see Rose McDermott, *Risk Taking in International Relations: Prospect Theory in Post-War American Foreign Policy* (Ann Arbor: Univ. of Michigan Press 1998), various chapters in Barbara Farnham (ed.), *Avoiding Losses/Taking Risks: Prospect Theory and International Conflict* (Ann Arbor: Univ. of Michigan Press 1994); and James W. Davis, *Threats and Promises: The Pursuit of International Influence* (Baltimore, MD: Johns Hopkins UP 2000), 32–5.

⁴⁸Schelling, *Arms and Influence*, ch. 2 on the distinction between deterrence and compellence.

defending the accepted status quo has a considerable advantage over the party trying to alter it. Another, related difference is that it is more difficult to signal assurance of restraint toward the target upon compliance when one is taking away something that is considered to be legitimately and rightfully owned by the other side. In all forms of coercive diplomacy, without credible assurances of restraint, the target has little incentive to comply.⁴⁹

Referring to the disincentives for the Soviets to exploit conventional advantages in a nuclear world, Jervis wrote that even a small percentage chance that local conventional war could escalate to strategic nuclear war means that, 'the ability to win a local war cannot be translated into the ability to fight it safely'.⁵⁰ The prospect of escalation to the strategic nuclear level, he argued, should deter the Soviets from risking everything they have, including survival itself, for the prospect of some new gains in territory and resources in Western Europe, the Middle East, or elsewhere.

Ironically, perhaps, Jervis's insights about what should have made the United States more relaxed during the Cold War, if we remain true to his logic, should make the United States and its allies more concerned about the prospect of Sino-American MAD in this century. If Chinese leaders were to think more like the less hawkish Cold War deterrence theorists, such as Jervis, about the meaning of the nuclear revolution, the development and/or maintenance of a secure second strike might indeed matter a great deal for conventional crises. Under the expectation that the conventionally superior United States would not want to run the risks of nuclear escalation by challenging China's important interests at the conventional level, a China with a newly established second strike capability might prove more aggressive in defense of its perceived interests than Ross anticipates. Moreover, because the status quo is more highly contested in maritime Asia than it was in Cold War central Europe, actors might be more likely in post-Cold War Asia to find themselves in conventional crises and even shooting wars, as all sides might feel as if they were defending the legitimate status quo against the other side's transgressions. In other words, the situation is rife with the possibility of escalation as both sides might believe that they are defending the status quo and each side might surmise that the backdrop of nuclear deterrence should bolster its position and force the other to back down.

⁴⁹Jervis, *The Meaning of the Nuclear Revolution*, 29–35; on this point, see also Davis, *Threats and Promises*.

⁵⁰Jervis, *The Meaning of the Nuclear Revolution*, 81.

Providing the Slippery Slope: China's New Conventional Capabilities and the Overlap with the Nuclear Deterrent

One of the concerning qualities of contemporary Chinese military trends is that nuclear modernization is occurring at the same time that China is developing, for the first time, credible conventional options to use in a coercion campaign against US friends and allies in East Asia and, perhaps, against forward deployed US forces. In the years immediately after the end of the Cold War Beijing largely lacked the ability to threaten forward deployed US forces in Asia in a credible fashion, unless they were so imprudent as to decide to engage China on land. China lacked the power to challenge US forces at sea or in the air outside the PRC. In part for this reason, the early 1996 Taiwan Strait crisis between the United States, still a serious matter indeed, was hardly the Berlin Crisis or the Cuban Missile Crisis.⁵¹

Especially since 1999, however, China has launched a fast-paced build-up of conventional capabilities to enforce militarily its rather expansive regional sovereignty claims in a way that could challenge the interests of the United States, its regional partners, or both. China has made a rather dramatic effort to rectify its lack of conventional options, with real defense budget growth averaging nearly 15 per cent per annum since 1999 and a much heavier emphasis than in the past on power projection capabilities. Obviously, if Chinese conventional forces themselves were unable to engage US forces in a meaningful way, it would make little sense to ponder the size of the shadow cast over conventional crisis and conflict by a Chinese second-strike capability.

For our purposes, it is also notable that the overlap in the types of systems that China deploys for conventional and nuclear deterrence could blur the lines between the two in an actual fight, particularly if US efforts to protect forward deployed US or allied forces from conventional attack were inadvertently to appear in Beijing as aimed at reducing, over time, China's ability to launch a retaliatory nuclear strike.

Ballistic Missiles as both Conventional and Strategic Weapons

Hundreds of new accurate, mobile solid-fueled ballistic missiles, controlled by China's Second Artillery since 1993, are central

⁵¹For a US government insider's view of the crisis, see Robert Suettinger, *Beyond Tiananmen: The Politics of US-China Relations, 1989–2000* (Washington, DC: Brookings Institution 2003); for a fine scholarly account, see Robert S. Ross, 'The 1995–96 Taiwan Straits Confrontation: Coercion, Credibility, and Use of Force', *International Security* 25/2 (Fall 2000), 87–123.

components of the joint conventional campaigns planned for scenarios related to Taiwan and other island contingencies. Beijing has reportedly already arrayed more than a thousand of these conventionally tipped missiles opposite Taiwan as part of a coercion campaign against the island. Certain types of conventionally tipped missiles can likely only reach Taiwan from the Chinese mainland, but others can reach US bases in Japan and elsewhere as well.

Complicating the picture further is the development of an anti-ship ballistic missile (ASBM) capability in China – the DF-21D, which the US Navy assesses to have reached ‘Initial Operational Capability’.⁵² In future crises these missiles could hold at risk forward deployed US naval forces.⁵³ As a result, in an escalating crisis or conflict, the temptation would likely be great for US commanders to order kinetic and electronic warfare attacks on Chinese mobile missiles and the command and control structures that manage them in order to protect US forces at sea, US bases, US allies, and/or US security partners in Taiwan. Moreover, in the future, US allies or regional partners might launch such attacks themselves with or without the knowledge and pre-approval of the United States. It may seem obvious that the United States should or would use its conventional superiority early on in a conflict to cripple China’s capacity to attack US bases and forward deployed forces. Beijing would be foolish to discount this possibility, but there has never been such an attack launched on the territory of an actor with nuclear weapons, let alone one with the diverse set of second-strike weapons systems that China is currently procuring. Complicating the picture further, any conventional or electronic attack on China’s conventional missile corps and its attendant command and control systems could be mistaken in Beijing as part of an attempted US first strike on China’s nuclear deterrent, which is heavily reliant on land-based missiles.⁵⁴

⁵²Defense Writers Group, ‘Vice Admiral David J. Dorsett Deputy CNO for Information Dominance, Transcript of Q&A,’ 5 Jan. 2011, <www.airforce-magazine.com/DWG/Documents/2011/January%202011/010511dorsett.pdf>.

⁵³Department of Defense, *Annual Report to Congress on the Military Power of the People’s Republic of China*, 2009 and 2010. For more on China’s ASBM capability, see Mark Stokes ‘China’s Evolving Conventional Strike Capability’, 2009, <http://project2049.net/documents/chinese_anti_ship_ballistic_missile_asbm.pdf>; Andrew S. Erickson ‘Ballistic Trajectory – China Develops New Anti-Ship Missile,’ *Jane’s Intelligence Review*, 2010, <www.janes.com/news/security/jir/jir100106_1_n.shtml>; and Andrew S. Erickson and David D. Yang, ‘Using the Land to Control the Sea? Chinese Analysts Consider the Antiship Ballistic Missile,’ *Naval War College Review* 62/4 (2009), 53–86.

⁵⁴During the Cold War Barry R. Posen argued that significant conventional attacks on Soviet assets in Eastern and Northern Europe could degrade key Soviet nuclear

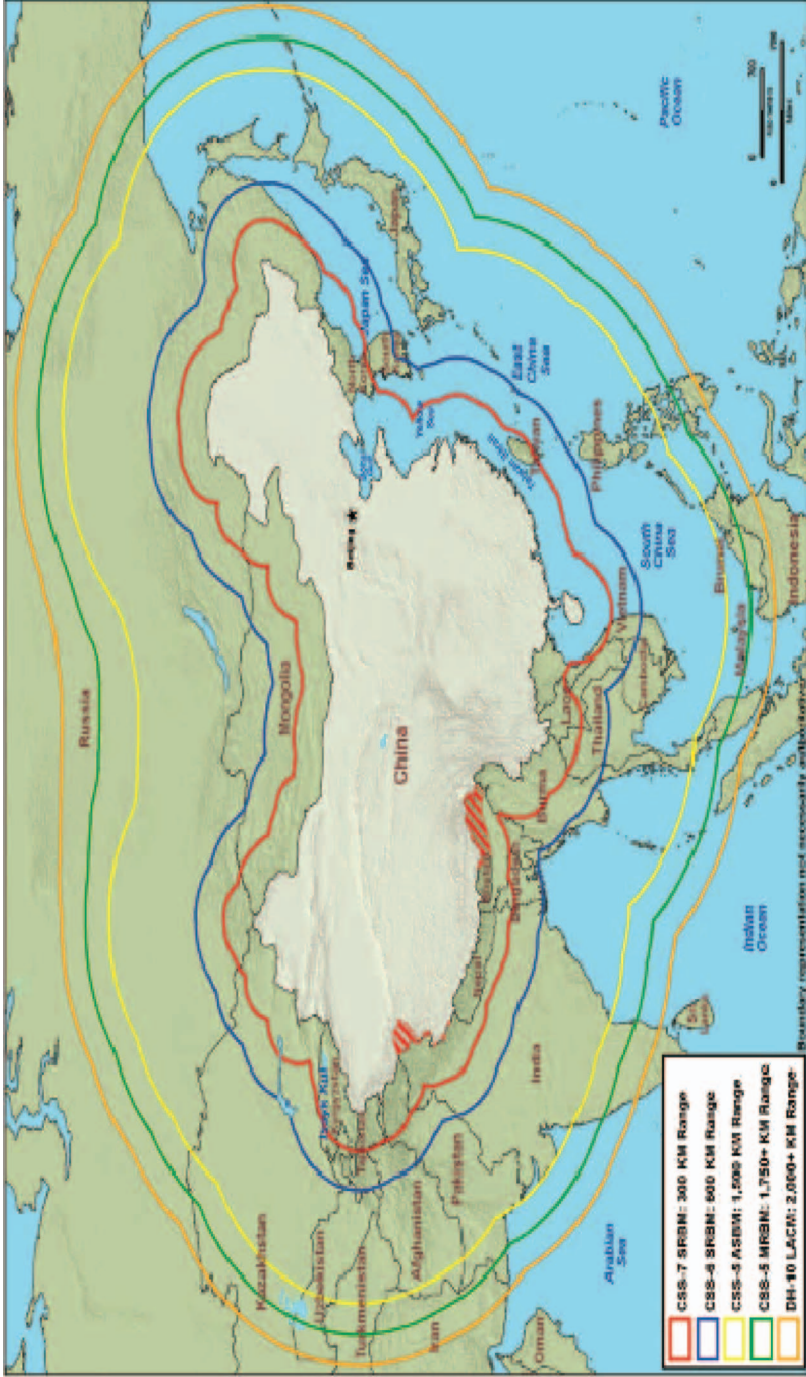


Figure 1. Ranges of China's land-based missiles.

Source: Department of Defense, Office of the Secretary of Defense, *Annual Report to Congress on the Military Power of the People's Republic of China* (2008), 30.

Submarines as both Conventional and Strategic Weapons

Another key component of China's growing ability to coerce its potential adversaries with conventional weapons is the development of a large and relatively sophisticated force of dozens of submarines to include diesel and nuclear-powered attack boats with increasingly sophisticated conventional weapons systems, including wake-homing torpedoes, sea mines, and, especially, cruise missiles. To counter this threat effectively and to reduce the potential number of casualties generated by Chinese submarines in an escalating conflict would require a great deal of attention by the United States and its security partners to anti-submarine warfare, both in terms of kinetic attacks on submarines and interference with the capability of submarines to track US forces and to communicate with their home bases. But such US actions might intentionally or inadvertently put at risk the ability for China to safely deploy the second leg of its nuclear dyad – submarine launched ballistic missiles on China's existing and new nuclear-powered strategic submarines (SSBNs). China first developed the *Xia*-class nuclear powered submarine (SSBN) with Julang-1 (JL-1) submarine launched ballistic missiles (SLBMs) but is developing a new class of such strategic weapons systems with longer range and more reliable missiles (the Julang-2) that could range the continental United States from the Western Pacific.⁵⁵

In traditional Cold War writings about MAD, a submarine based deterrent is often considered doubly stabilizing: until the late 1970s the missiles they carried provided little value in the launching of a first strike due to limits on accuracy and destructive power but, because they are hard to find and destroy in a first strike, submarines were ideal

retaliatory capabilities in ways that could trigger nuclear escalation. Barry R. Posen, *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell UP 1991). If Posen's analysis is correct, his analysis should apply even more clearly to attacks on the Chinese homeland in a future US–China conflict.

⁵⁵The *Xia* never conducted an extended patrol and her JL-1 SLBMs had only a range of 1,770 kilometers. China started development of the Type 094 *Jin*-class SSBN in the 1980s. According to the Office of Naval Intelligence, China may build five Type 094 SSBNs, each will be outfitted with 12 developmental JL-2 submarine-launched ballistic missiles (SLBMs). These SLBMs have an estimated range of at least 7,200 kilometers and are equipped with penetration aids and will allow China to reach three-fourths of the United States from just northeast of the Kuril Islands. ONI released information that as of late 2006, the Type 094 was already conducting sea trials, and would most likely reach Initial Operating Capacity (IOC) by 2008. See GlobalSecurity. Org, 'Weapons of Mass Destruction: Office of Naval Intelligence (ONI), Type 094 Jin-class Ballistic Missile Submarine', 2009, <www.globalsecurity.org/wmd/world/china/type_94.htm>; and Chase and Erickson, 'An Undersea Deterrent,' 2.

antidotes to enemy first strikes.⁵⁶ One major conundrum regarding submarine-based nuclear deterrents, however, is what is to be done if the submarines lose communications with the home base and the top leadership of the country in question in a crisis or shooting war.⁵⁷ Will submarine commanders have pre-delegated authority to fire nuclear missiles at the target if they lose touch with their commanders at home?⁵⁸ If not, does the new leg of the dyad have meaning when a concerted 'decapitation' strike on the command and control systems of the homeland can shut down the ability of the submarines to retaliate with nuclear weapons against an attacking enemy. Of course, if firing authority is pre-delegated to commanders, the risk of inadvertent escalation from a conventional war to a nuclear war goes up greatly, as any extended significant conventional disturbance to the command and control structure could accidentally spark nuclear escalation. Because it never relied extensively in the past on submarines to guarantee a nuclear deterrent, China has never before faced this stark dilemma of the trade-off of 'positive control' (the ability to launch nuclear retaliation under the most dire circumstances, which is at the heart of MAD) and 'negative control,' the ability to prevent inadvertent escalation by units with independent ability to launch.⁵⁹ Complicating the situation further, the United States and its allies, for all the reasons offered above, will have a strong incentive to increase its capabilities to hunt submarines and make it more difficult for Chinese commanders to communicate with submarines at sea during conventional conflict.

Space-Based Capabilities as Conventional and Nuclear Assets

Both countries have also demonstrated an ability to shoot down the others' satellites, an operation that could have both conventional and

⁵⁶See Robert Jervis, 'Cooperation Under the Security Dilemma', *World Politics* 30 (1976), 167–214, at 207.

⁵⁷Many indicators suggest that China has backward command and control arrangements with a nuclear arsenal that resembles emerging nuclear powers more than those of the United States or Soviet Union. See Department of Defense, 'Report to Congress', 2008. On submarine systems see *ibid.*, 'Report to Congress', 2010, 34.

⁵⁸There is speculation that given the primitive nature of China's nuclear command and control, some operational units will have been predelegated launch authority under certain conditions. See Polk, *China's Nuclear Command and Control*, 14–15. For the view that submarine-based nuclear forces will be under tight central command, see John Wilson Lewis and Xue Litai, *Imagined Enemies: China Prepares for Uncertain War* (Stanford UP 2006), 120.

⁵⁹See Paul Bracken, *The Command and Control of Nuclear Forces* (New Haven, CT: Yale UP 1985); Bruce G. Blair, *Strategic Command and Control: Re-Defining the Nuclear Threat* (Washington DC: Brookings 1985).

strategic implications and could also serve to cloud the thresholds between different types of warfare.⁶⁰ The Chinese demonstrated this capability in its unannounced test of 11 January 2007, and US Navy demonstrated the anti-satellite (ASAT) capabilities of the US theater missile defense systems in Operation 'Burnt Frost', the much more transparent and publicly executed February 2008 shoot down of a failed and falling US satellite by a US Navy Aegis missile defense system.⁶¹ If in a crisis or limited war the United States were to use its conventional anti-satellite capabilities against Chinese space assets in order to complicate China's ability to track and hit forward deployed US and allied forces with conventional weapons, this too might be viewed in Beijing as part of a broader effort to denude China's ability successfully to detect and absorb a first strike and thereafter, launch a devastating second strike.

The Contested Status Quo in Asia

Another major problem for the stability of conventional and nuclear coercive diplomacy in maritime Asia is that, unlike the Central European theater for much of the Cold War, the 'status quo' delineation of territorial rights is highly contested. For example, Chinese historiography places Taiwan, the 'Diaoyudao' (Senkaku islands) in the East China Sea, and virtually all of the Paracels and Spratly islands in the South China Sea under China's sovereignty. Moreover, Beijing's claims often lack clarity and Chinese elites have even sometimes promoted the vague notion that the entire South China Sea is included in China's 'historic waters.' Other regional actors in Tokyo, Manila, Hanoi, Kuala Lumpur, and Jakarta do not agree with these Chinese claims, and would almost certainly view armed enforcement of those claims as revisionist, not status quo assertions of Chinese power.⁶² The United States has taken no position on the sovereignty of any of these disputed islands, as is consistent

⁶⁰Marc Kaufman and Dafna Linzer, 'China Criticized for Anti-Satellite Missile Test,' *Washington Post*, 19 Jan. 2007.

⁶¹For the Defense Department's official video coverage of 'Burnt Frost', see <www.youtube.com/watch?v=pDqNjnUNU18>.

⁶²On maritime disputes in general, see Taylor Fravel, *Strong Borders, Secure Nation: Cooperation and Conflict in China's Territorial Disputes* (Princeton UP 2008), ch. 6. On Taiwan, see Alan Romberg, *Rein in at the Brink of the Precipice: American Policy Toward Taiwan and US-PRC Relations* (Washington DC: Henry L. Stimson Center 2003); Richard Bush, *Untying the Knot: Making Peace in the Taiwan Strait* (Washington DC: Brookings Institution 2005); and Nancy Bernkopf Tucker (ed.), *Dangerous Strait: The US-Taiwan-China Crisis* (New York: Columbia UP 2005).

with US maritime strategy around the world. Instead, Washington has simply asked that all of the disputants manage their differences in a peaceful manner so as to protect the safety and security of the region and especially the international sea routes that run throughout the disputed waters.⁶³ The only partial exception to this general rule was the assertion by Deputy Secretary of State Richard Armitage in 2004 that the Senkaku islands fall under the purview of the US–Japan alliance because they have long been under Japanese administrative control (notably, Armitage said nothing about the Japanese claim of sovereignty, however).⁶⁴ This view was repeated by Secretary of State Hillary Clinton in October 2010 following the stand-off between China and Japan over the latter’s detention of a Chinese fishing boat captain whose boat had collided with a Japanese Coast Guard vessel near Senkaku.⁶⁵ In July of that year Secretary Clinton also ruffled Beijing’s feathers by demanding that all claims in the South China Sea be based in customary international law and suggesting that all disputants increase mutual confidence and prevent military disputes in the region by building a more formal multilateral mechanism to address the disputes, a process that Washington would be willing to facilitate.⁶⁶

Since the accepted territorial status quo is much more contested there than it was during most of the Cold War in Central Europe, the clean logic of the US and its allies being able to deter revisionism and defend the status quo relatively easily may fall by the wayside in post-Cold War East Asia. While one might say that the United States should be able to prevail because of its conventional superiority, following Jervis’s logic and the contributions of prospect theory, one has to ask under what conditions the United States would want to unleash that superiority on a nuclear armed state with a secure second strike, especially one that might perceive itself as defending its legitimate and

⁶³See testimony of Deputy Assistant Secretary of State Scot Marciel, Committee on Foreign Relations Subcommittee on East Asian and Pacific Affairs, 19 July 2009, <<http://foreign.senate.gov/testimony/2009/MarcielTestimony090715p.pdf>>.

⁶⁴Remarks and Q&A at the Japan National Press Club, 2 Feb. 2004 cited by Emma Chanlett-Avery and Weston S. Konishi, *The Changing US–Japan Alliance: Implications for US Interests* (Congressional Research Service 2009), 16.

⁶⁵See Briefing by Secretary Clinton, Japanese Foreign Minister Maehara, Honolulu, Hawaii, 27 Oct. 2010, in the 28 Oct. 2010, release by the Office of the Spokesperson, US Department of State, <www.america.gov/st/texttrans-english/2010/October/20101028123524su0.6718823.html>.

⁶⁶For a brief review of this issue, see Thomas J. Christensen, ‘The Advantages of an Assertive China: Responding to Beijing’s Abrasive Diplomacy’, *Foreign Affairs* 90/2 (March/April 2011), 54–67.

long-claimed territorial sovereignty. The fact that the United States and others do not necessarily agree with the Chinese definition of the status quo does not matter much from an analytic point of view if the goal is to prevent conflict and escalation. In fact, such disagreement is an added danger because for reasons offered by Schelling and Jervis, we should expect China, the United States, and its regional partners to doggedly refuse to back down, with Washington and Beijing viewing the other as leveling compelling threats, rather than deterrent ones, and each side fearing greatly the long-term reputational consequences of appeasement. For example, under such circumstances Beijing might worry not only that backing down would affect its future credibility abroad, but the legitimacy of the Communist Party regime at home. For its part, the United States might fear that backing down could undermine the credibility of its alliance commitments. Since the ability of the United States to project military power regionally and globally is dependent to a large degree on alliances and basing in allied countries, this would likely be a serious concern for Washington.

Chinese Views on the Firebreak

For the optimistic logic based on the ‘stability-instability paradox’ to hold in future US-China crises over Taiwan or other potential flashpoints, we would need rather clear firebreaks between conventional and nuclear warfare. Are nuclear deterrence and conventional deterrence or conventional war-fighting seen as entirely separate categories? All things being equal, the stricter the adherence to an unconditional version of their publicly declared ‘No First Use’ policy, the more Chinese elites should adhere to the tenets of the Cold War ‘stability-instability paradox’ and the less consequential for the United States should be the Chinese acquisition (or maintenance of) a second strike capability. This is particularly true under conditions of persistent Chinese conventional inferiority. Put another way, since Jervis’s ‘threat that leaves something to chance’ requires a slippery slope between conventional and nuclear warfare, in order for a nuclear second-strike capability to give a conventionally inferior actor such as China perceived leverage over a conventionally superior adversary such as the United States requires some story by which conventional war-fighting might trigger escalation to the nuclear level without the stronger conventional and nuclear power simply choosing to attack with its nuclear weapons. In the Cold War, that slippery slope was created for Jervis by the lack of a US No First Use policy combined with forward deployed tactical and theater nuclear weapons designed to offset Soviet numerical superiority in mechanized divisions at the front in Central Europe. What plausible scenarios exist for escalation from

the conventional to the nuclear level in a hypothetical US-China conventional clash over Taiwan or any other dispute?

Since China's rocket force, the PLA's Second Artillery Corps, is entrusted to develop both conventional and nuclear coercive capabilities, its doctrinal work, the *Science of Second Artillery Campaigns*, sheds important light on this issue. Especially since the book was not designed for readers outside of China's security establishment, it is an important supplement to other publicly available writings by Chinese military and civilian strategic thinkers.

When reading the book, one is initially struck by the seriousness with which the authors treat China's No First Use (NFU) Doctrine, offering explanations based on morality and China's diplomatic reputation for China's public stance on this issue.⁶⁷ Various sections of the book are consistent with the conclusions Evan Medeiros culled from publicly available sources in 2007.⁶⁸ But the book also reveals several problems with relying too heavily on China's NFU doctrine as a means to adjudicate whether Chinese elites subscribe to the theoretical concepts behind the stability-instability paradox or not. The problem is not simply the PRC's sincerity about NFU, but the apparent flexibility in its definition and the basic notion held by Chinese strategists that nuclear and conventional deterrence should be mixed in crises and wars in ways that could weaken the firebreak between conventional and nuclear war. In addition, there are key passages in the book which suggest that there are future scenarios in which China will have to consider scrapping the No-First Use restrictions altogether and to threaten nuclear retaliation for purely conventional attacks against the Chinese homeland. For all of these reasons, Jervis's slippery slope from conventional to nuclear war seems potentially alive and well in the post-Cold War era and, therefore, China's acquisition of a second strike capability for the first time or its maintenance of a second strike capability at a time when it may finally be able to engage US forces at sea and in the air with conventional weapons may carry much more importance than is allowed by the optimists.

The book reveals key ways in which China's NFU doctrine still allows for blurring of the firebreak between conventional and nuclear warfare. At the most abstract level, in conflicts with nuclear powers, the meaning of 'No First Use' itself is clouded by a parenthetical addition to the definition which suggests that, at least in principle, elites in the PRC

⁶⁷SSAC, 282.

⁶⁸Evan 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: US Army War College 2007), 156.

might not require a nuclear attack on China, but only the ‘threat’ of such an attack, in order for China to use nuclear weapons. After expounding on the reasons for the Communist Party leadership’s NFW stance, the authors write: ‘because of this, the Second Artillery’s nuclear retaliation, fundamentally speaking (cong zongti jiang shang), are actions implemented under nuclear conditions (or conditions of nuclear threat).’⁶⁹ In any crisis or conventional engagement with the United States, China could declare itself under nuclear threat. Noting the parenthetical qualifier is not just a nitpick when one considers other important parts of the book in which the authors assess the ways in which conventional deterrence, conventional war-fighting, and nuclear deterrence are bound together. These statements are rather at odds with the idea that China sees the nuclear and conventional worlds as fully distinct categories. The authors write. ‘The most important type of future regional wars will be conventional conflicts under conditions of nuclear deterrence, deterrence and actual war-fighting will exist at the same time, and their function and effectiveness will be mutually complementary (xianghu buchong).’⁷⁰

Following a section on how weaker parties need to hide their true intentions and capabilities from stronger actors, the book states that conventional and nuclear deterrence ‘bring out the best in each other’ (xiang de yi zhang).⁷¹ In conditions of attack or nuclear threat by ‘strong enemies,’ the book calls for what it refers to as ‘coordination’ (xietong) between conventional and nuclear forces in ‘double deterrence’. The authors continue: ‘Conventional missiles will be used as firepower and as a conventional deterrent; and the wielding of nuclear capability as a threat of nuclear counterattack against a strong enemy will serve our nation in its political and diplomatic struggle.’⁷² Adopting language similar to Jervis’s analysis of how US nuclear weapons leveled the conventional playing field for NATO in Cold War central Europe, the book reads: ‘China’s strategic missile corps is an important means by which the supreme command can limit warfare, restrict conflict (zhiyue zhanzheng), prevent splitting [of the country] (fangzhi fenlie), and maintain peace; *it is an effective nuclear means by which to level the playing field with stronger enemies*, and as such, wielding of deterrence (weishe yunyong) is an important way (tujing) to achieve the aforementioned objectives’

⁶⁹See SSAC, 298–9 for detailed coverage of the reasons behind China’s NFW doctrine. The quotation is from p. 299.

⁷⁰See SSAC, 133. This sentence is repeated verbatim on p. 275.

⁷¹SSAC, 279.

⁷²SSAC, 202

(emphasis added).⁷³ Soon thereafter, the nuclear and conventional deterrence are called a ‘two-bladed sword’ that can cause enemies to ‘abandon their plots to launch war’ in the first place because they would ‘worry about receiving a retaliatory attack that was difficult to bear.’⁷⁴

In the following section on limiting escalation, active and passive nuclear deterrence is considered not only a means by which escalation from conventional to nuclear war can be prevented, but also a way to prevent ‘conventional attacks on nuclear facilities that would create radioactive leaks’, or, more abstractly to ‘prevent the enemy from giving us unbearable losses by launching medium or high intensity airstrikes against our important strategic targets’.⁷⁵ A section on how Chinese nuclear weapons support conventional operations perhaps comes closest to Jervis’s Cold War concept of the wielding of Schelling’s ‘threat that leaves something to chance’ to constrain enemy conventional adventurism. The authors write, ‘In conventional local wars under informatized conditions, simply exposing one’s nuclear capabilities at an appropriate level, flexibly employing various forms of [nuclear] deterrence, cannot help but cause the enemy to solemnly consider it might pay very heavy costs that are difficult to bear when using informatized conventional weapons in airstrikes against us.’⁷⁶

Perhaps most disconcerting for those who would rely on China’s No First Use Doctrine as a reassurance that Chinese modernizing nuclear capabilities will only be relevant in a nuclear war, one section late in the book discusses situations in which China might need to ‘lower the nuclear deterrence threshold’ and thereby ‘adjust nuclear policy’ by threatening to use nuclear weapons even if the opponent had not used nuclear weapons first. The authors write:

Lowering the nuclear deterrence threshold refers to a time in which a stronger military power with nuclear missiles relies on its absolute superiority in high-tech conventional weapons to conduct a series of medium-level or high-level air strikes and our side has no good methods to ward this off; the nuclear missile corps should, according to the orders of the supreme command, adjust our nuclear deterrence policy without delay, taking the initiative (zhudong) to implement a powerful nuclear threat, thereby blocking through coercion (shezu) the stronger enemy’s sustained conventional air strikes against our side’s important strategic targets (yi fang zhongda zhanlüe mubiao).

⁷³SSAC, 272.

⁷⁴SSAC, 273.

⁷⁵SSAC, 273.

⁷⁶SSAC, 274.

The authors offer a fourfold set of examples of increasing abstraction for when the threshold should be lowered. ‘The [appropriate] time for the nuclear missile corps’s lowering of the threshold is: threat of conventional attack on nuclear facilities (nuclear power stations) in order to prevent the creation of catastrophic large-scale radiation leakage; threat of conventional attack against important strategic targets that would threaten the lives and safety of a broad swath of the people such as hydroelectric dams, etc...; the launching of medium-level or high-level conventional attacks on our capital and other large cities, etc. that are political or economic centers;’... and ‘sustained escalation of conventional war, with our side’s strategic situation [becoming] extremely weak and our national safety and survival gravely threatened’. Adopting language that would seem consistent with Jervis’s logic about the fragility of firebreaks, the authors continue, ‘in order to compel the enemy to stop its war of invasion, and rescue the nation from its peril, the nuclear rocket corps, in accordance with the orders of the supreme command, should resolutely threaten to launch nuclear missiles at our enemy’.⁷⁷

At least one expert in the United States, Gregory Kulacki, has publicly dismissed the strategies described in the doctrinal book as referring only to nuclear ‘bluffing,’ claiming that a proper reading of the original Chinese text makes clear that No First Use principle will hold under all circumstances.⁷⁸ My own reading of the same text shows no evidence for Kulacki’s conclusion, which, if wrong, would potentially be a very dangerous impression for US leaders to hold. The clear implication of Kulacki’s analysis is that the United States could unleash unlimited conventional attacks on the PRC against any type of target while blithely assuming that there would be no risk of escalation to nuclear war. But nowhere in the text does anything like the word ‘bluffing’ appear. Moreover, this section of the doctrinal work accords with other internally circulated and public writings by other Chinese military analysts. Another internally circulated volume published by former Second Artillery deputy commander Lieutenant General Zhao Xijun, *Intimidation Warfare*, makes arguments about

⁷⁷SSAC, 294. The parenthetical inclusion of nuclear power stations in the list is probably meant to mean ‘to include’ nuclear power stations because one does not get the sense that the authors expect to view conventional strikes on nuclear weapons facilities with conventional weapons as anything short of a first-strike attempt.

⁷⁸Gregory Kulacki cited in Rachel Oswald, ‘US-China Nuclear Talks Stymied by Distrust and Miscommunication’, *Atlantic Monthly*, 31 Oct. 2011, <www.theatlantic.com/international/archive/2011/10/us-china-nuclear-talks-stymied-by-distrust-and-miscommunication/247589/>.

the complementary nature of conventional and nuclear deterrence that are similar to those in doctrinal book cited above. Zhao also portrays the No First Use doctrine as one debated in scholarly circles within the military given the nature of modern, high-tech warfare.⁷⁹ Although he never abandons the official line on NFU explicitly, he calls into question the rigidity of the doctrine in the same way that the doctrinal book does, stating that ‘reducing the nuclear threshold (adjusting nuclear policy)’ is a ‘main method of military deterrence for the nuclear missile force’.⁸⁰ Works cited by Erickson and Yeaw similarly state that China might threaten nuclear retaliation for conventional strikes on ‘nuclear facilities’ or other important strategic targets or in situations when territorial integrity might be involved. One military author offers the most sweeping, flexible, and, therefore, dramatic prescription: China could use nuclear weapons, whenever ‘China’s core national security and development interests are fundamentally undermined.’⁸¹

From the perspective of the United States, the most likely nuclear power with superior conventional capabilities that might find itself in conflict with China, it is an unwelcomed fact that Jervis’s slippery slope seems alive and well in the minds of Chinese elites and that they seem to reject the orthodox adherence to a No First Use Doctrine that could warrant more strategic confidence in the United States based on the stability-instability paradox. One disconcerting future scenario that arises from China’s combination of conventional and nuclear coercive capabilities is that Chinese ballistic missiles and submarines will likely figure so prominently at the conventional level in any future crisis or shooting war between the United States and the People’s Republic of China. Moreover, we know that China’s military strategists worry greatly about the US conventional threat to China’s nuclear retaliatory capability and there is certainly no reason to believe that China would adhere to a strict definition of No First Use if its retaliatory nuclear capability were to appear to come under severe conventional threat. The Second Artillery’s doctrinal book cited above, for example, even goes so far as to discuss the possibility that strategic nuclear missile units must be prepared to launch ‘in advance’ (tiqian fashe) under ‘special circumstances’, like when they are threatened by an enemy

⁷⁹Zhao Xijun, ed., *She Zhan–Daodan Weishe Zonghengtan [Intimidation Warfare: A Comprehensive Discussion on Missile Deterrence]* (Beijing: National Defense UP 2003), 92.

⁸⁰*Ibid.*, 34.

⁸¹Chase Erickson, and Yeaw, 70, and 95–6, the quotation is on p. 70 and is from Senior Colonel Wang Zhongchun, ‘Nuclear Challenges and China’s Choices’, *China Security* 5 (Winter 2007), 52–65, at 60.

surprise attack on their positions (shoudao di xiji de weixie).⁸² In a path-breaking article, Alastair Iain Johnston argues along these lines, stating that some in China ‘argue disingenuously that a first strike on an enemy whose attack is imminent is still a retaliatory, second-strike act’.⁸³ One then must wonder about the potential escalatory implications of actual conventional attacks in wartime on either mobile missile sites or submarines or command and control nodes that guide those forces.

The situation is complicated further by the mix of nuclear and conventional coercive capabilities that China has decided to develop. In a future crisis or war with the United States China will likely be threatening to fire or may actually fire conventionally tipped mobile missiles or submarine launched torpedoes or cruise missiles at US forward deployed forces and bases. Given the growing challenge of these conventional Chinese coercive capabilities (often referred to, erroneously in my opinion, as ‘area denial capabilities’), US military commanders’ desire to track and kill missiles and submarines and suppress their command and control capabilities might be great indeed. If the United States were to launch such attacks, China’s leadership might mistake them as part of a conventional first strike against China’s nuclear retaliatory capability, even if China’s nuclear second strike capability is not the intended target of such attacks. So, one ‘high-ranking military officer’ reportedly told an American scholar in 2006 that China would likely begin a ‘nuclear-counterattack of some sort’ if the United States were inadvertently to strike with conventional weapons an important nuclear command and control node for China’s nuclear forces.⁸⁴ Other publicly available military writings similarly cloud the lines between conventional and nuclear war. For example, one piece co-authored by a senior Second Artillery officer, states that ‘definitively establishing whether the adversary has broken the nuclear threshold is not necessarily a straightforward issue’.⁸⁵ While Fravel and Medeiros generally argue that China adheres to a second-strike or No First Use doctrine, they too question whether that doctrine would survive an attempt to disable China’s nuclear retaliatory capability with conventional weapons.⁸⁶

⁸²SSAC, 310–11.

⁸³Alastair Iain Johnston, ‘China’s New “Old Thinking”: The Concept of Limited Deterrence’, *International Security* 20/3 (Winter 1995–96), 5–42, 23

⁸⁴Chase, Erickson, and Yeaw, ‘Chinese Strategic and Theater Missile Forces’, 97.

⁸⁵Rong Yu and Peng Guangqian, ‘Nuclear No-First-Use Revisited’, *China Security* 13 (2009), 81–90.

⁸⁶Fravel and Medeiros, ‘China’s Search’, 83.

Given the analysis above a US president would have to consider carefully the value of such strikes when they could trigger a nuclear response from China. The growing number of more capable Chinese missiles obviously poses an increased security risk to the United States if escalation is a real risk. But there is a more subtle and more realistic problem posed by the Chinese development of or maintenance of a secure second strike capability, particularly in a world in which China can, for the first time, challenge US forward deployed forces conventionally over issues that lack a clearly defined and universally accepted 'status quo.' Chinese elites's apparent awareness of the dilemmas that its strategic nuclear forces will pose for a future US president considering conventional strikes against the Chinese mainland in response to those conventional challenges might make a conventionally inferior China much more resolute in defending its interests against US intervention than a China with a more suspect and vulnerable set of nuclear capabilities.

On the positive side of the ledger, one might argue that the development of a second strike capability by the PRC might be significant but might simply render Beijing more confident in its ability to deter Taiwan's declaration of *de jure* independence over the long run and therefore more relaxed in the face of Taiwan's domestic or international political initiatives that might appear to be moving the island in that direction. This too is a real possibility but again, would suggest that China's nuclear modernization is quite meaningful, albeit with less negative outcomes. To determine the plausibility of this scenario would require understanding better both Chinese attitudes about its new nuclear capabilities and about those capabilities' utility in preventing what Beijing sees as smaller provocations from growing into larger ones.⁸⁷

Conclusion

During the Cold War Jervis laid out reasons why it would be hard to imagine how an attacker in a conventional war in central Europe could believe with any certainty that the war could remain limited to the conventional level. In the context of US-China relations confidence regarding escalation control might be reduced by what Brad Roberts calls the 'close integration of China's nuclear and non-nuclear strike systems and theater and intercontinental capabilities'.⁸⁸ Since China's Second Artillery (and to some degree its Navy) now have roles to play in war-fighting, conventional deterrence, and nuclear deterrence, even

⁸⁷I am grateful to Alastair Iain Johnston for raising this excellent point.

⁸⁸Roberts, 'Strategic Deterrence Beyond Taiwan', 200.

in a world in which Chinese leaders maintain a more basic and minimalist second strike mentality about nuclear weapons, it may be increasingly challenging to imagine how, in a conventional conflict between forward deployed US forces and land-based and sea-based Chinese assets, the two sides can avoid engagements that would have dangerous implications for the Chinese nuclear second-strike force and, therefore, for escalation control by both sides.

Fortunately, even though both nations' militaries consider contingencies in which they might have to fight each other, US-China relations are not adversarial and, despite a persistent lack of strategic trust across the Pacific, do not come anywhere near the level of mistrust and hostility witnessed between the United States and the Soviet Union. Sino-American economic and diplomatic cooperation is much deeper than anything witnessed during the Cold War between Moscow and Washington. But applying theoretical lessons from the Cold War to the contemporary Asia Pacific does not mean one views US-Chinese relations as another Cold War. The second half of the Cold War arguably was more stable than the first in large part because the two sides learned the implications of MAD. While increased transparency and greater dialogue are not a panacea to strategic problems between actors, they can help prevent catastrophically naïve thinking about the implications of certain new developments and tactics in peacetime and in time of crisis.

One might argue that the dangers of MAD outlined above should be an added force for stability in US-PRC security relations, above and beyond the economic and political cooperation that exists. Precisely because the risk of escalation of conventional conflicts exists, both sides should be very cautious about challenging the status quo, knowing the dangers of escalation if one were to adopt revisionist policies. There is a basic problem with such an analysis. We need to ask whether or not strategic thinkers on both sides of the Pacific have fully considered the strategic realities mentioned above. For example, it is not at all clear that Chinese strategists understand the dangers inherent in basing one's coercive military capabilities for limited conventional conflict on platforms similar to those reserved for strategic nuclear deterrence.⁸⁹ Nor is it clear that US officials have thought sufficiently hard about the implications for nuclear escalation of any force protection package that might be designed to destroy, blind, or isolate from command and control China's conventional forces arrayed against US allies, security partners, and forward deployed US forces (including submarines and mobile, solid-fueled missiles). For this reason, we need greater dialogue

⁸⁹Matthew Evangelista, *Unarmed Forces: The Transnational Movement to End the Cold War* (Ithaca, NY: Cornell UP 1999).

about crisis management and greater transparency not only in the trends and goals in China's military modernization but also in Chinese doctrine. Chinese elites will need to think much harder and much more clearly about the potential escalatory dynamics of attacking US forward deployed forces, US bases, or US friends and allies, especially with the general types of systems – missiles, submarines, and anti-satellite weapons – that have both utility in both conventional and nuclear exchanges. The United States, for its part, will have to think hard about the potential escalatory potential of strikes against the Chinese mainland with conventional weapons, even if the intention of such strikes is purely to protect US forces in the field from conventional attack.

One hopeful sign was the initial establishment in 2008 of a strategic nuclear doctrine between the US Department of Defense and China's People's Liberation Army in which abstract issues, such as crisis stability can be discussed. Unfortunately, this dialogue was suspended after one round following US arms sales to Taiwan in late 2008 and, although it has been revived in a somewhat different form in 2011, has never developed into what the American side had hoped to achieve.⁹⁰

Chinese diplomats sometimes balk at the idea that the PRC should participate in the kind of strategic dialogues with the United States that the Soviets did during the Cold War. They understandably want to avoid replacing the Soviet Union in the minds of American strategists or treating the US-China relationship as anything akin to a Cold War. This is a problem that might be ameliorated by a simple adjustment in diplomatic presentation on the US side. Rather than suggesting that Washington had such a dialogue with our Soviet nuclear rivals and now wants one with the Chinese, US diplomats and defense officials should say that we were able to have constructive dialogue *even* with our sworn Cold War enemy, the Soviet Union, so we can surely have constructive dialogue with China, whom we hardly consider an enemy and with whom we enjoy a broad spectrum of cooperation. In fact, when properly considered, it might be healthy for both Chinese and American strategists to adopt a little more Cold War thinking in considering the dangers and opportunities created by new weapons technologies, deployments, and doctrines in the region. Joint Sino-American studies of Cold War thinking about nuclear and conventional competitions and the relationship between the two and the history of Cold War crisis management could enhance the security of both

⁹⁰Oswald, 'US-China Nuclear Talks Stymied by Distrust and Miscommunication'.

countries simultaneously, proving in a new and somewhat counter-intuitive way that the relationship is not a zero-sum game.

A second and, arguably, knottier problem is that the status quo is not nearly as clear in the contemporary Asia Pacific as it was in Central Europe, at least in the last two decades of the Cold War. With the possible exception of West Berlin, there was really no close Cold War analogy for relations between Taiwan and Mainland China or the Diaoyudao/Senkaku islands dispute between Japan, a US ally, and the PRC. Similarly, the Soviet Union did not claim, as China does, that an expansive archipelago and adjacent seas that were not currently under its control were inextricable parts of its sovereign territory. Since what might sincerely be considered defense of the status quo by Chinese elites might appear to others, including in Washington, to be aggressive, revisionist behavior, the United States might be in a much more difficult position in preventing conventional conflicts that could escalate into nuclear tensions than we were during the Cold War. Resolving maritime disputes in Asia in peacetime, and preferably before the military trends analyzed in this article progress further, would be a very good starting point. Even though the United States is not and should not be involved in the details of how those disputes are settled, it should encourage negotiations and confidence-building measures.

Acknowledgements

For expert research assistance and commentary, the author would like to thank Oriana Mastro. For very helpful comments he would like to thank the anonymous reviewers, Michael Chase, Owen Cote, Andrew Erickson, Taylor Fravel, Charles Glaser, James Goldgeier, Avery Goldstein, Justin Higgins, Robert Jervis, Alastair Iain Johnston, Elizabeth Kier, Jonathan Kirshner, Kier Lieber, Adam Liff, Sean Lynn-Jones, Rose McDermott, Jonathan Mercer, Cynthia Roberts, Thomas Schelling, Randall Schweller, Jack Snyder, Marc Trachtenberg, James Wirtz and especially James Davis, the inspirational organizer, and all the participants in the June 2010 conference in honor of Robert Jervis at Columbia University

Note on Contributor

Thomas J. Christensen is William P. Boswell Professor of Politics of Peace and War and Director of the China and the World Program at Princeton University. A version of this article will appear in James W. Davis (ed), *Psychology, Strategy and Conflict: Perceptions of Insecurity in International Relations* (Oxford: Routledge, forthcoming 2012).

Bibliography

- Blair, Bruce G., *Strategic Command and Control: Re-Defining the Nuclear Threat* (Washington DC: Brookings 1985).
- Bracken, Paul, *The Command and Control of Nuclear Forces* (New Haven, CT: Yale UP 1985).
- Bush, Richard, *Untying the Knot: Making Peace in the Taiwan Strait* (Washington DC: Brookings Institution 2005).
- Chanlett-Avery, Emma and Weston S. Konishi, *The Changing US-Japan Alliance: Implications for US Interests* (Washington DC: Congressional Research Service 2009).
- Chase, Michael S., Andrew S. Erickson and Christopher Yeaw, 'Chinese Theater and Strategic Missile Force Modernization and its Implications for the United States,' *Journal of Strategic Studies* 32/1 (Feb. 2009), 67–114.
- Chase, Michael S. and Andrew S. Erickson, 'An Undersea Deterrent?' *Proceedings* 135/6 (2009), <www.usni.org/magazines/proceedings/story.asp?STORY_ID=1907>.
- Christensen, Thomas J., 'The Advantages of an Assertive China: Responding to Beijing's Abrasive Diplomacy,' *Foreign Affairs* 90/2 (March/April 2011), 45–67.
- CSIS, IDA, RAND Corporation, 'CFISS Conference on US-China Strategic Nuclear Dynamics', (2006), <www.comw.org/cmp/fulltext/0606uschinaconf.pdf>.
- Davis, James W., *Threats and Promises: The Pursuit of International Influence* (Baltimore, MD: Johns Hopkins UP 2000).
- Defense Writers Group, 'Vice Admiral David J. Dorsett Deputy CNO for Information Dominance, Transcript of Q&A,' 5 Jan. 2011, <www.airforce-magazine.com/DWG/Documents/2011/January%202011/010511dorsett.pdf>.
- Department of Defense, Office of the Secretary of Defense, *Annual Report to Congress on the Military Power of the People's Republic of China*, 2008, 2009, and 2010.
- Desciscio, Dominic, 'China's Space Development and Nuclear Strategy,' in Lyle J. Goldstein and Andrew S. Erickson (eds), *China's Nuclear Force Modernization* (Newport, RI: Center for Naval War Studies 2005), 49–64.
- Erickson, Andrew S., 'Ballistic Trajectory – China Develops New Anti-Ship Missile,' *Jane's Intelligence Review*, 2010, <www.janes.com/news/security/jir/jir100106_1_n.shtml>.
- Erickson, Andrew S. and David D. Yang, 'Using the Land to Control the Sea? Chinese Analysts Consider the Antiship Ballistic Missile,' *Naval War College Review* 62/4 (2009), 53–86.
- Evangelista, Matthew, *Unarmed Forces: The Transnational Movement to End the Cold War*. (Ithaca, NY: Cornell UP 1999).
- Farnham, Barbara (ed.), *Avoiding Losses/Taking Risks: Prospect Theory and International Conflict* (Ann Arbor: Univ. of Michigan Press 1994).
- Federation of American Scientists, 'DF-31,' <www.fas.org/nuke/guide/china/icbm/df-31.htm>.
- Fravel, Taylor, *Strong Borders, Secure Nation: Cooperation and Conflict in China's Territorial Disputes* (Princeton UP 2008).
- Fravel, Taylor M. 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.
- Gill Bates, James Mulvenon and Mark Stokes, 'The Chinese Second Artillery Corps: Transition to Credible Deterrence,' in James Mulvenon and Andrew N.D. Yang (eds), *The People's Liberation Army as an Organization: Reference Volume v1.0*. (Santa Monica, CA: RAND Corporation 2001), 510–86.
- GlobalSecurity.Org, 'Weapons of Mass Destruction: Office of Naval Intelligence (ONI) Type 094 Jin-class Ballistic Missile Submarine', 2009, <www.globalsecurity.org/wmd/world/china/type_94.htm>.
- Godwin, Paul H.B., 'Potential Chinese Responses to US Ballistic Missile Defense' (2002), <www.stimson.org/china/pdf/CMDWP3.pdf>, 63.
- Goldstein, Avery, *Deterrence and Security in the Twenty-First Century: China, Britain, France, and the Enduring Legacy of the Nuclear Revolution* (Stanford UP 2000).

- Gray, Colin, 'Strategic Stability Reconsidered', *Survival* 109/4 (1980), 135–54.
- Hagerty, Devin T., 'Nuclear Deterrence in South Asia: the 1990 Indo-Pakistani Crisis', *International Security* 20/3 (Winter 1995–96), 70–114.
- Jervis, Robert, 'Cooperation Under the Security Dilemma', *World Politics* 30 (1976), 167–214.
- Jervis, Robert, *The Illogic of American Nuclear Strategy* (Ithaca, NY: Cornell UP 1984).
- Jervis, Robert, *The Meaning of the Nuclear Revolution, the Prospect of Armageddon* (Ithaca, NY: Cornell UP 1989).
- Johnston, Alastair Iain, 'China's New "Old Thinking": The Concept of Limited Deterrence', *International Security* 20/3 (Winter 1995–96), 5–42.
- Kaplan, Fred, *The Wizards of Armageddon* (Stanford UP 1983).
- Kaufman, Marc and Dafna Linzer, 'China Criticized for Anti-Satellite Missile Test', *Washington Post*, 19 Jan. 2007.
- Kristensen, Hans M., Robert S. Norris, and Matthew G. McKinzie. 'Chinese Nuclear Forces and US Nuclear War Planning,' (Federation of American Scientists/Natural Resources Defense Council, November 2006), <www.fas.org/nuke/guide/china/Book2006.pdf>.
- Lewis, John Wilson and Xue Litai, *Imagined Enemies: China Prepares for Uncertain War* (Stanford UP 2006).
- Lieber, Keir A. and Daryl G. Press, 'The End of MAD? The Nuclear Dimension of US Primacy,' *International Security* 30/4 (Spring 2006), 7–44.
- Lieber, Keir A. and Daryl Press, 'The Nukes We Need: Preserving the American Deterrent', *Foreign Affairs* 88/11 (Nov./Dec. 2009), 39–51.
- McConaughy, Christopher, 'China's Undersea Nuclear Deterrent: Will the US Military Be Ready?' in Lyle L. Goldstein and Andrew Erickson (eds), *China's Nuclear Force Modernization* (Newport, RI: Center for Naval War Studies 2005), 23–48.
- McDermott, Rose, *Risk Taking in International Relations: Prospect Theory in Post-War American Foreign Policy* (Ann Arbor: Univ. of Michigan Press 1998).
- Medeiros, Evan, '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: US Army War College 2007).
- National Intelligence Council, *Foreign Missile Developments and the Ballistic Missile Threat Through 2015* (2001).
- Office of the Spokesperson, US Department of State, 'Briefing by Secretary Clinton, Japanese Foreign Minister Maehara, Honolulu, Hawaii, October 27, 2010', 28 Oct. 2010, <www.america.gov/st/texttrans-english/2010/October/20101028123524su0.6718823.html>.
- Oswald, Rachel, 'US-China Nuclear Talks Stymied by Distrust and Miscommunication', *Atlantic Monthly*, 31 Oct. 2011, <www.theatlantic.com/international/archive/2011/10/us-china-nuclear-talks-stymied-by-distrust-and-miscommunication/247589/>.
- Polk, Stephen, 'China's Nuclear Command and Control', in Lyle J. Goldstein with Andrew S. Erickson, *China's Nuclear Force Modernization* (Newport, RI: Center for Naval War Studies 2005), 7–22.
- Posen, Barry R., *Inadvertent Escalation: Conventional War and Nuclear Risks* (Ithaca, NY: Cornell UP 1991).
- PRC Information Office of the State Council, *China's National Defense in 2006*.
- PRC Information Office of the State Council, *China's National Defense in 2008*.
- Reif, Kingston, 'Nuclear Weapons: The Modernization Myth', *The Bulletin of the Atomic Scientists Online*, 2009, <www.thebulletin.org/web-edition/features/nuclear-weapons-the-modernization-myth>.
- Roberts, Brad, 'China-US Nuclear Relations: What Relationship Best Serves US Interests?', Institute for Defense Analysis 2001, Institute for Defense Analyses, <www.au.af.mil/au/awc/awcgate/dtra/china_us_nuc.pdf>.
- Roberts, Brad, 'Strategic Deterrence Beyond Taiwan', in Roy Kamphausen, David Lai and Andrew Scobell (eds), *Beyond the Strait: PLA Missions Other than Taiwan* (Carlisle Barracks, PA: Army War College Strategic Studies Institute 2009), ch. 6.

- Romberg, Alan, *Rein in at the Brink of the Precipice: American Policy Toward Taiwan and US-PRC Relations* (Washington DC: Henry L. Stimson Center 2003).
- Rong Yu and Peng Guangqian, 'Nuclear No-First-Use Revisited', *China Security* 13 (2009), 81–90.
- Ross, Robert S., 'The 1995–96 Taiwan Straits Confrontation: Coercion, Credibility, and Use of Force', *International Security* 25/2 (Fall 2000), 87–123.
- Ross, Robert S., 'Navigating the Taiwan Strait: Deterrence, Escalation Dominance, and US-China Relations', *International Security* 27/2 (Fall 2002), 48–85.
- Rowen, Henry and Albert Wohlstetter, 'Varying Responses with Circumstances', in Jonathan Holst and Uwe Nerlich (eds), *Beyond Nuclear Deterrence: New Aims, New Arms* (New York, NY: Russak 1977), 225–38.
- Schelling, Thomas, *Arms and Influence* (New Haven, CT: Yale UP 1967).
- Snyder, Glenn, 'The Balance of Power and the Balance of Terror' in Paul Seabury (ed.), *The Balance of Power* (San Francisco, CA: Chandler Publishers 1965), 184–201.
- Stokes, Mark, 'China's Evolving Conventional Strike Capability', 2009, <http://project2049.net/documents/chinese_anti_ship_ballistic_missile_asbm.pdf>.
- Suettinger, Robert, *Beyond Tiananmen: The Politics of US-China Relations, 1989–2000* (Washington DC: Brookings Institution 2003).
- Tucker, Nancy Bernkopf (ed.), *Dangerous Strait: The US–Taiwan–China Crisis* (New York: Columbia UP 2005).
- Tversky, Amos and Daniel Kahneman, 'Prospect Theory: An Analysis of Decision under Risk', *Econometrica* 47/2 (March 1979), 263–91.
- US Department of the Navy, Office of Naval Intelligence. *Worldwide Submarine Challenges* (1997).
- Wang Zhongchun, 'Nuclear Challenges and China's Choices', *China Security* 5 (Winter 2007), 52–65.
- Yao Yunzhu 'China's Perspective on Nuclear Deterrence', *Air and Space Power Journal* (March 2010).
- Yu Xijun (ed.), *Di Er Pao Bing Zhanyi Xue* [The Science of Second Artillery Campaigns] (Beijing: PLA Press 2004).
- Zhao, Xijun (ed.), *She Zhan–Daodan Weishe Zonghengtan* [Intimidation Warfare: A Comprehensive Discussion on Missile Deterrence] (Beijing: National Defense UP 2003), 92.