

The 21st Century's Great Military Rivalry

By Graham Allison and Jonah Glick-Unterman

A quarter-century ago, China conducted what it called “missile tests” bracketing the island of Taiwan to deter it from a move toward independence by demonstrating that China could cut Taiwan’s ocean lifelines. In response, in a show of superiority that forced China to back down, the United States deployed two aircraft carriers to Taiwan’s adjacent waters. If China were to repeat the same missile tests today, it is highly unlikely that the United States would respond as it did in 1996. If U.S. carriers moved that close to the Chinese mainland now, they could be sunk by the DF-21 and DF-26 missiles that China has since developed and deployed.

This article presents three major theses concerning the military rivalry between China and the United States in this century. First, the era of U.S. military primacy is over: dead, buried, and gone—except in the minds of some political leaders and policy analysts who have not examined the hard facts.¹ As former Secretary of Defense James Mattis put it starkly in his 2018 National Defense Strategy, “For decades the United States has enjoyed uncontested or dominant superiority in every operating domain. We could generally deploy our forces when we wanted, assemble them where we wanted, and operate how we wanted.”² But that was then. “Today,” Mattis warned, “every domain is contested—air, land, sea, space, and cyberspace.”³ As a result, in the past two decades, the United States has been forced to retreat from a strategy based on primacy and dominance to one of deterrence. As President Joe Biden’s National Security Advisor Jake Sullivan and his National Security Council colleague Kurt Campbell acknowledged in 2019, “The United States must accept that military primacy will be difficult to restore, given the reach of China’s weapons, and instead focus on deterring China from interfering with its freedom of maneuver and from physically coercing U.S. allies and partners.”⁴ One of the architects of the Trump administration’s 2018 National Defense Strategy put it less diplomatically and more succinctly: “The era of untrammled U.S. military superiority is over.”⁵

Graham Allison is the Douglas Dillon Professor of Government at the Harvard Kennedy School, where he was the Founding Dean. He is a former U.S. Assistant Secretary of Defense for Policy and Plans, former Director of Harvard’s Belfer Center for Science and International Affairs, and the author most recently of *Destined for War: Can America and China Escape Thucydides’s Trap?* (Mariner Books, 2018). Jonah Glick-Unterman is a Research Assistant in the Belfer Center.

Second, while America's position as a global military superpower remains unique—with power projection capabilities no one can match, more than 50 allies bound by collective defense arrangements, and a network of bases on almost every continent—both China and Russia are now serious military rivals and even peers in particular domains. Russia's nuclear arsenal has long been recognized as essentially equivalent to America's, and while China's nuclear arsenal is much smaller, Beijing has nonetheless deployed a fleet of survivable nuclear forces sufficient to ensure mutually assured destruction. The Department of Defense (DOD) designation of China and Russia as Great Power competitors recognizes that they now have the power to deny U.S. dominance along their borders and in adjacent seas.

Third, if soon there is a “limited war” over Taiwan or along China's periphery, the United States would likely lose—or have to choose between losing and stepping up the escalation ladder to a wider war. Deputy Secretary of Defense Kathleen Hicks and her fellow members of the National Defense Strategy Commission provided a vivid scenario of a war over Taiwan that the United States could lose.⁶ In response to a provocative move by Taiwan, or in a moment of hubris, if China were to launch a military attack to take control of Taiwan, it would likely succeed before the U.S. military could move enough assets into the region to matter. If the United States attempted to come to the defense of Taiwan with the forces currently in the area or that could arrive during the Chinese assault, it would not be able to materially affect the outcome.⁷ As former Vice Chairman of the Joint Chiefs of Staff Admiral James Winnefeld and former Central Intelligence Agency (CIA) Acting Director Michael Morell wrote last year, China has the capability to deliver a *fait accompli* to Taiwan before Washington would be able to decide how to respond.⁸ The National Defense Strategy Commission reached a similar conclusion: the United States “might struggle to win, or perhaps

lose, a war against China.”⁹

Beyond these findings, we begin with three further bottom lines up front:

- In 2000, anti-access/area-denial (A2/AD) systems—by which China could prevent U.S. military forces from operating at will—was just a People's Liberation Army (PLA) acronym on a briefing chart. Today, China's A2/AD operational reach encompasses the First Island Chain, which includes Taiwan (100 miles from mainland China) and U.S. military bases in Okinawa and South Korea (500 miles from mainland China). As a result, as President Barack Obama's Under Secretary of Defense for Policy Michèle Flournoy put it, in this area, “the United States can no longer expect to quickly achieve air, space, or maritime superiority.”¹⁰ As former Commander of U.S. Indo-Pacific Command Admiral Philip Davidson testified to Congress in March 2021, on its current trajectory, in the next 4 years China's A2/AD envelope will extend to the Second Island Chain, which includes America's principal military installations on the U.S. territory of Guam (2,500 miles from mainland China).¹¹
- No U.S. official has analyzed this issue more assiduously than Robert Work, who served as Deputy Secretary of Defense under three secretaries before stepping down in 2017. While the acid test of military forces is their performance in combat, the next best indicator is wargames. As Work has stated publicly, in the most realistic wargames the Pentagon has been able to design simulating war over Taiwan, the score is 18 to 0. And the 18 is not Team USA. Reporting on an Air Force wargame conducted last fall documented a different outcome: the U.S. military successfully repelled a Chinese invasion of Taiwan, but doing so required fielding systems that it does not yet have, that are not in

production, and that are not even planned for development, in addition to undertaking major structural reforms and convincing Taiwan to multiply its defense spending.¹² These findings are—and should be—cause for alarm since Taiwan is the most likely source of military conflict between China and the United States.¹³ As Admiral Davidson warned in March 2021, the risk of conflict over Taiwan is “manifest during this decade.”¹⁴

- In the words of Chairman of the Joint Chiefs of Staff General Mark Milley, when “all the cards are put on the table,” the United States no longer dwarfs China in defense spending.¹⁵ In 1996, China’s reported defense budget was 1/30 the size of America’s. By 2020, China’s declared defense spending was one-quarter ours. Adjusted to include spending on military research and development and other under-reported items, it approached one-third of U.S. spending. And when measured by the yardstick that both the CIA and the International Monetary Fund (IMF) judge the best single metric for comparing national economies, it is over one-half U.S. spending and on a path to parity.¹⁶ Moreover, while the U.S. defense budget buys weapons and builds forces to sustain America’s unique global presence, which includes commitments on almost every continent, China’s defense budget is focused locally on preparing for contingencies in Northeast Asia.

Given the secrecy that surrounds some aspects of this topic, the clamor of advocates seeking to persuade Congress to fund their budgets, and a press that tends to hype the China threat, it is often difficult to assess the realities. Because so many of the public claims are misleading, this article does not address the U.S.-China cyber rivalry. Nonetheless, by focusing on the hard facts that are publicly

available about most of the races and listening carefully to the best expert judgments about them, in the military rivalry with China, the United States has entered a grave new world.¹⁷

Should recognition of ugly military realities in this new world be cause for alarm? Yes. But the path between realistic recognition of the facts, on the one hand, and alarmist hype, on the other, is narrow. Moreover, in the current climate, with American political dynamics fueling increasing hostility toward China, some have argued that talking publicly about such inconvenient truths could reveal secrets or even encourage an adversary. But as former U.S. military and civilian Defense Department leaders have observed, China’s leaders are more aware of these brute facts than are most members of the American political class and policy community. Members of Congress, political leaders, and thought leaders have not kept up with the pace of change and continue repeating claims that may have made sense in a period of American primacy but that are dangerously unrealistic today. As a few retired senior military officers have stated pointedly, ignorance of military realities has been a source of many civilians’ enthusiasm for sending U.S. troops into recent winless wars.

The Rise of a Peer

America’s demonstration of overwhelming military superiority in 1996 left China no option but to back down in its own backyard. But this vivid reminder of China’s “century of humiliation” also steeled Chinese leaders’ determination to build up Beijing’s military strength to ensure this could never happen again.

In the years since, as the 2020 DOD annual report on China described, the People’s Republic of China has “marshalled the resources, technology, and political will...to strengthen and modernize the PLA in nearly every respect.”¹⁸ Indeed, the overall balance of conventional military power along

China's borders has shifted dramatically in China's favor. In Admiral Davidson's careful understatement, there is "no guarantee" of victory in a conflict against China.¹⁹

This shift in the balance of power follows PLA reforms that are unprecedented in depth and scale. In November 2015, Xi Jinping directed the most extensive restructuring of the PLA in a generation for China to have a military that is, in his words, "able to fight and win wars."²⁰ Under a Central Military Commission chaired by Xi, the PLA created five joint theater commands and established the Joint Logistics Support Force and the Strategic Support Force, which is responsible for high-technology missions. In addressing the 19th Party Congress in 2017, Xi proclaimed the PLA's objectives to become a fully "mechanized" force by 2020, a fully "modernized" force by 2035, and a "world-class" force by 2049.²¹

These reforms have been tailored to reinforce PLA loyalty to the Chinese Communist Party and specifically to Xi as its chairman and to align China's military power with its national ambitions. In Xi's words, achieving the "great revival of the Chinese nation" requires "unison between a prosperous country and strong military." The "Strong Army Dream" and its mandate to be able to "fight and win" are foundational to the "China Dream."²²

A modernized PLA will enable Beijing to deter third-party interventions, conduct regional missions, and protect China's extra-regional interests. Deterring and defeating threats to China's sovereignty are its armed forces' highest priorities. As Xi declared at the 19th Party Congress, "We will never allow anyone, any organization, or any political party, at any time or in any form, to separate any part of Chinese territory from China!"²³ Indeed, China has done everything it can to communicate unambiguously that, to prevent the loss of Taiwan, it is prepared to go to war—even though it recognizes that war with the United States risks escalation to nuclear war.

As a reminder of China's willingness to go to war for what it sees as its core interests, Americans should never forget what happened in Korea. As American troops approached China's border, even though it had only a peasant army, many of whom did not even have shoes, Beijing nonetheless attacked the world's sole superpower. After the United States came to the rescue of South Korea when it was attacked by North Korea, as U.S. troops moved up the peninsula rapidly toward the Yalu River, which marks the border between North Korea and China, they discounted warnings that China might intervene on behalf of the North. The possibility that a poor country still consolidating control of its own territory after a long civil war would attack the world's most powerful military, which had just 5 years earlier dropped atomic bombs on Hiroshima and Nagasaki to end World War II, seemed inconceivable. But Mao Zedong did just that. In late October 1950, Douglas MacArthur woke to find a vanguard of 300,000 Chinese troops slamming U.S. and allied forces. In the weeks that followed, Mao's forces not only halted the allied advance but also beat United Nations (UN) forces back to the 38th Parallel.²⁴

The Tyranny of Distance

Geography matters. Military planners talk about the "tyranny of distance." As illustrated in figure 1, to support conflict along China's borders and in its adjacent seas, U.S. ships must travel for multiple days or weeks. This unalterable asymmetry is a key driver behind China's A2/AD strategy, whereby China has built capabilities on its own mainland and shifted the military balance in potential conflicts over Taiwan or in the South and East China seas.

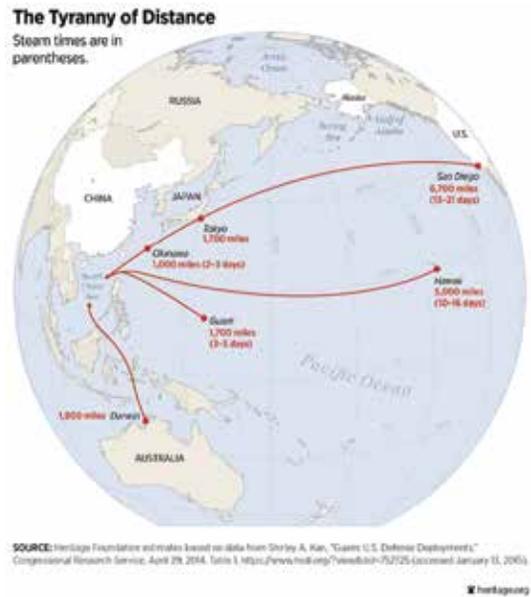
A critical component of these capabilities is the PLA's arsenal of intermediate-range missiles. Having elevated the PLA Rocket Force to an independent service in 2015, Beijing has amassed what the U.S. Air Force judges "the most active and

diverse ballistic missile development program in the world.²⁵ China has more than 1,250 ground-launched ballistic and cruise missiles with ranges between 500 and 5,500 kilometers, while the United States fields only one type of conventional ground-launched ballistic missile with a range of 70 to 300 kilometers and no ground-launched cruise missiles.²⁶ In 2020, the PLA launched more ballistic missiles for testing and training than the rest of the world combined.²⁷ Most prominent, the PLA Rocket Force developed and tested the DF-21 and DF-26 medium-range ballistic missiles, which have been dubbed “carrier-killers,” to credibly threaten America’s most prized power projection platform.²⁸

The PLA Rocket Force’s vast stocks of conventional guided munitions underwrite what U.S. strategists have called a “projectile-centric strategy.”²⁹ Projectiles are cheaper than air forces, easier to mass in a salvo exchange than airborne-based strikes, and harder to hunt than fixed airbases. In a conflict, they can penetrate U.S. forward defenses and cripple key nodes in U.S. battle networks while outranging reinforcements surging to the theater.³⁰ As leading RAND analyst James Dobbins and other RAND researchers have explained, “the range and capabilities of Chinese air and sea defenses have continued to grow, making U.S. forward-basing more vulnerable and the direct defense of U.S. interests in the region potentially more costly.”³¹

No longer can the United States rely on nuclear escalation dominance, either. In 2000, China had a “minimum deterrent” strategy underwritten by only a few hundred nuclear warheads and a handful of intercontinental ballistic missiles that could reliably reach the American homeland to destroy American cities.³² Moreover, these missiles were vulnerable to a preemptive U.S. nuclear first strike. Today, according to Pentagon estimates, China still has a modest arsenal, with warhead numbers in the low 200s—less than 5 percent of America’s 5,500 warheads.³³ Nonetheless, Beijing has concluded that

Figure 1.



this force is sufficient to ensure that it would survive an American first strike and be able to retaliate with a counterstrike that could destroy enough of the United States to create a nuclear stalemate. Both sides’ entrenchment in a state of mutually assured destruction will only deepen if China expands its nuclear arsenal to 700 deliverable warheads by 2027, as the Pentagon anticipates.³⁴

The United States has recognized this reality in sizing its own missile defense systems. As the Obama administration’s 2010 *Ballistic Missile Defense Review Report* determined:

Russia and China have the capabilities to conduct a large-scale ballistic missile attack on the territory of the United States. . . . While the [ground-based midcourse defense] system would be employed to defend the United States against limited missile launches from any source, it does not have the capacity to cope with large scale Russian or Chinese missile attacks.³⁵

Thus, if Ronald Reagan was right when he declared that “a nuclear war cannot be won and must never be fought,” then between these nuclear superpowers (that is, nations with robust, reliable second-strike capabilities), the menu of viable military options cannot include nuclear attack.³⁶

Wargames: A Perfect Record

The acid test of military forces is how they perform in combat. Short of that, wargames provide the next best indicator. U.S.-China wargames in plausible conflict scenarios offer a discouraging operational picture of the local balance of power. Most of these games are classified, and the most significant the most highly so. Particularly when the results are not favorable for Blue (Team USA), they are rarely publicized. Yet one of the features of the American system is that former officials sometimes speak candidly after they leave government. As Senator John McCain’s former Senate Armed Services Committee Staff Director Christian Brose has stated bluntly, “Over the past decade, in U.S. wargames against China, the United States has a nearly perfect record: We have lost almost every single time.”³⁷

American strategists have been stunned by this scorecard and its operational implications. Summarizing a recent series of wargames, former defense planner David Ochmanek observed that, when we fight China, “Blue gets its ass handed to it.”³⁸ Ochmanek noted that “For years the Blue Team has been in shock because they didn’t realize how badly off they were in a confrontation with China.”³⁹ Former Deputy Secretary Work similarly found that “whenever we have an exercise, and when the Red Force really kind of destroys our command and control, we stop the exercise and say, ‘Okay, let’s restart. And, Red, don’t be so bad.’”⁴⁰

In the wargames, U.S. forces struggle to achieve superiority in key operating domains early in a conflict. According to Ochmanek, “all five domains of warfare are contested from the outset of hostilities.”⁴¹

Likewise, as Work observed, “In the first five days of the campaign, we are looking good. After the second five days, it’s not looking so hot. That is what the war games show over and over and over.”⁴² Moreover, U.S. forces incur substantial losses of platforms and personnel. “We lose a lot of people,” Ochmanek acknowledged. “We lose a lot of equipment,” he continued.⁴³ U.S. forward-deployed forces, including airbases in Okinawa and Guam, surface ships, non-stealthy aircraft, and other exposed U.S. assets proximate to the battlespace, suffer early and persistent salvos of conventional precision munitions.⁴⁴ In Brose’s summary, “The command and control networks that manage the flow of critical information to U.S. forces in combat would be broken apart and shattered by electronic attacks, cyber attacks, and missiles. Many U.S. forces in combat would be rendered deaf, dumb, and blind.”⁴⁵

The U.S. military has had extensive recent combat experience, but much of it is not that helpful for preparing to meet a peer competitor. As Deputy Secretary Work has explained, in those campaigns the local balance of power at the outset of conflict “didn’t really matter. . . . We would’ve crushed them like cockroaches once we assembled the might of America.”⁴⁶ But a conflict with China today would be different. As Brose concluded, a war over Taiwan “could be lost in a matter of hours or days even as the United States planned to spend weeks and months moving into position to fight.”⁴⁷

These uncomfortable findings are supported by the most authoritative public assessment of the operational balance, RAND’s “U.S.-China Military Scorecard.” It determined that, in a conflict over Taiwan, China would enjoy the advantage in U.S. airbase attack and anti-surface warfare. It would have approximate parity in establishing air superiority, penetrating U.S. airspace, and conducting and defending against counterspace operations. As the report concluded, with the United States no longer enjoying major advantages in nine key operational

dimensions, “Asia will witness a progressively receding frontier of U.S. dominance.”⁴⁸

Of course, there are choices the United States could make that would lead to changes on this scorecard in the years ahead. One that has been highlighted by Admiral Winnefeld would be to develop new high-power microwave weapons for disrupting electronics using electromagnetic energy.⁴⁹ But these choices have not yet been made.

Future Technologies

China is laser-focused on military applications of emerging technologies, including artificial intelligence (AI), quantum computing, hypersonic missiles, and space assets. As former Vice Chairman of the Joint Chiefs of Staff General Paul Selva warned in 2018, on the current path, the United States will lose its technological superiority around 2020, and China will surpass the United States by the 2030s.⁵⁰

In the decades since the shock and awe demonstrated by U.S. guided munitions warfare in Operation *Desert Storm*, China has pursued what former Deputy Secretary Work has aptly called an “offset strategy with Chinese characteristics.” As he describes it, Beijing has undertaken a “patient, exquisitely targeted, and robustly resourced technologically driven offset strategy” to achieve technological parity and, ultimately, superiority.⁵¹

Chinese strategists believe AI may be decisive in Beijing’s campaign to surpass the United States as the world’s premier military power.⁵² Former Chairman of the Joint Chiefs of Staff General Joseph Dunford concurred, “Whoever has the competitive advantage in artificial intelligence and can field systems informed by artificial intelligence, could very well have an overall competitive advantage.”⁵³ AI functions as a force multiplier by improving vision and targeting, mitigating manpower issues, hardening cyber defenses, and accelerating decisionmaking. Its advantages were plain to see in

the Defense Advanced Research Projects Agency’s August 2020 AlphaDogfight Trials, when an AI algorithm swept a human F-16 pilot 5 to 0. In the past decade, DOD stood up new organizations such as the Defense Innovation Unit and Strategic Capabilities Office and announced its Third Offset Strategy, an initiative to preserve the U.S. military’s technological edge against rising peer competitors.⁵⁴ Similarly, reflecting an acute appreciation of AI’s disruptive potential, Beijing launched a strategy to achieve AI dominance by 2030 and introduced the concept of “intelligitization” of warfare to operationalize AI and its enabling technologies, including cloud computing and unmanned systems.⁵⁵

China is ahead in some sectors of quantum technology, a game-changing asset that could guarantee secure communications, expose stealth aircraft, complicate submarine navigation, and disrupt battlefield communications.⁵⁶ In 2016, China introduced a quantum technology strategy to achieve major breakthroughs by 2030 and launched the world’s first quantum satellite. Also that year, Chinese company China Electronics Technology Group Corporation reportedly developed the first quantum radar that could detect stealth aircraft and resist jamming and spoofing, leaving Lockheed Martin, which had been experimenting with this technology for nearly a decade, in its rearview mirror.⁵⁷ And in June 2016, the Shanghai Institute of Microsystem and Information Technology announced that it had built what could be the world’s longest-range submarine detector using a cryogenic liquid nitrogen-cooled superconducting quantum interference device magnetometer.⁵⁸ As National Security Council Senior Director for Technology and National Security Tarun Chhabra has written, although the United States has an overall edge in quantum computing, Beijing is on pace to overtake this advantage if the United States idles.⁵⁹

China also leads the United States in developing hypersonic weapons, which exceed Mach 5 and

maneuver to their target.⁶⁰ According to the Defense Intelligence Agency, hypersonic weapons will “revolutionize warfare by providing the ability to strike targets more quickly, at greater distances, and with greater firepower.”⁶¹ While Beijing has successfully tested its DF-17 hypersonic missile on multiple occasions as well as a nuclear-capable Fractional Orbital Bombardment System equipped with a hypersonic glide vehicle, it will be years until the United States has a similar platform.⁶²

Meanwhile, Xi Jinping has extended his “China Dream” into a “space dream.” Beijing operates over 120 intelligence, surveillance, and reconnaissance and remote sensing satellites—second only to the United States—while expanding its BeiDou precision, navigation, and timing system as an alternative to GPS.⁶³ In 2019, the BeiDou constellation surpassed GPS in size and visibility.⁶⁴ In April 2021, China launched the core module of its first long-term space station, achieving in 20 years what took the United States 40.⁶⁵ As the U.S.-China Economic and Security Review Commission concluded, “China’s single-minded focus and national-level commitment to establishing itself as a global space leader . . . threatens to undermine many of the advantages the United States has worked so long to establish.”⁶⁶

Beijing’s acquisition of frontier technologies has been guided by key organizing concepts, including what it calls “civil-military fusion” and “leapfrog development.”⁶⁷ As part of China’s extensive military reforms inaugurated in 2016, civil-military fusion facilitates technological transfers between the defense and civilian sectors, builds cohesion among researchers in support of military objectives, and drives innovation.⁶⁸ Simultaneously, the PLA has sought to achieve advantages in what it calls “strategic frontline” technologies that the United States has not mastered or may not be capable of mastering.⁶⁹

China may also be ahead in aligning frontier technologies with warfighting concepts that exploit

them. Beijing’s warfighting concept of “system destruction warfare” envisions future warfare as a contest of operational systems. PLA planners prioritize achieving information superiority by crippling an opponent’s battle networks at the outset of conflict using a suite of capabilities, including antisatellite and electromagnetic pulse weapons. In 2015, China took a crucial step toward preparing for system destruction warfare by establishing its Strategic Support Force, which centrally coordinates the PLA’s space, cyber, and electronic warfare capabilities. China’s doctrinal innovations may give it an edge in a potential conflict with the United States. As former Deputy Secretary Work cautioned, “The side that finds the better ‘fit’ between technology and operational concepts likely will come out on top.”⁷⁰

While the PLA has focused on the future fight, the United States military has optimized for low-intensity operations, doubled down on legacy platforms, and left innovating startups struggling to survive the Pentagon’s acquisitions process.⁷¹ For 20 years, the Pentagon prioritized counterinsurgency and counterterrorism—in Admiral Winnefeld’s words, “sticking its head in the sand.”⁷² Meanwhile, as General Milley put it, China “went to school” on the U.S. military’s strategy and capabilities: the PLA “watched us very closely in the First Gulf War, Second Gulf War, watched our capabilities and in many, many ways they have mimicked those and they have adopted many of the doctrines and the organizations.”⁷³ Likewise, the Chairman of the Senate Armed Services Committee Jack Reed has noted, “For the past several decades, China has studied the [U.S.] way of war and focused its efforts on offsetting our advantages. This strategy has been successful, largely because China began without any significant legacy systems.”⁷⁴ As a result, as defense analyst Andrew Krepinevich warned, the United States today is at risk of “having the wrong kind of military, conducting the wrong kinds of operations, with the wrong equipment.”⁷⁵



Rendering of Tiangong Space Station between October 2021 and March 2022, with Tianhe core module in the middle, two Tianzhou cargo spacecrafts on left and right, and Shenzhou-13/14 crewed spacecraft at nadir (Courtesy Shujianyang)

The Curious Question of Defense Spending

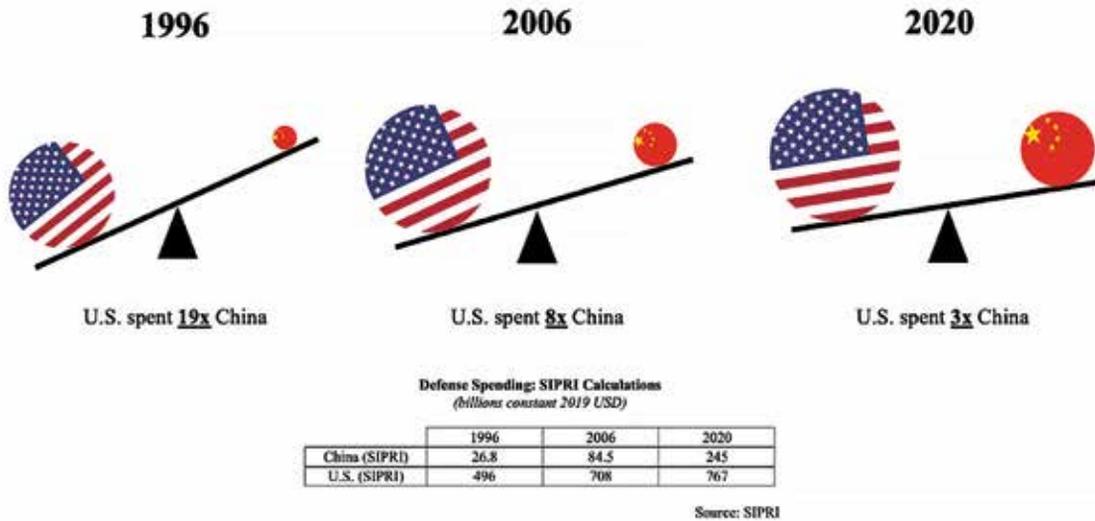
Skeptics who find it hard to believe claims about a dramatic shift in the military balance under way often ask, “But doesn’t U.S. defense spending dwarf that of China?” The answer is yes, but the reality is more complicated. Measured by the traditional yardstick, market exchange rate, in 1996, China’s reported defense budget was 1/30 the size of America’s. By 2020, it was one-quarter.⁷⁶ When spending that appears in other budgets—for example, on military research and development—is included, its actual defense budget is one-third America’s.⁷⁷ And if measured by the best yardstick of economic and military potential (purchasing power parity [PPP]), Beijing’s defense budget is over two times its *stated* budget—which brings it to over half of America’s and on a path to parity.

In 2020, the U.S. defense budget was \$738 billion, while China’s reported budget was \$178 billion

at the prevailing market exchange rate.⁷⁸ But when items that China excludes from its official reports that appear in the U.S. defense budget, including research and development (on which the United States spends over \$100 billion), veterans’ retirement payments, and construction expenses, are included, as the Stockholm International Peace Research Institute found, since 1996 the gap in spending narrowed from 19:1 to 3:1.⁷⁹

Moreover, in comparing defense budgets, it is essential to consider not only how much each pays for items but also what each gets at the prices paid. Both the CIA and the IMF have concluded that the best single metric for comparing national expenditures is PPP. As the *Economist* has illustrated vividly in its “Big Mac index,” for the \$5.81 a consumer pays for one Big Mac in the United States, one gets one and a half Big Macs in Beijing. Similarly, when the PLA buys bases or ships or DF-21 missiles, it pays in renminbi and at prices substantially below the cost of equivalent products in the United States.⁸⁰

Figure 2.



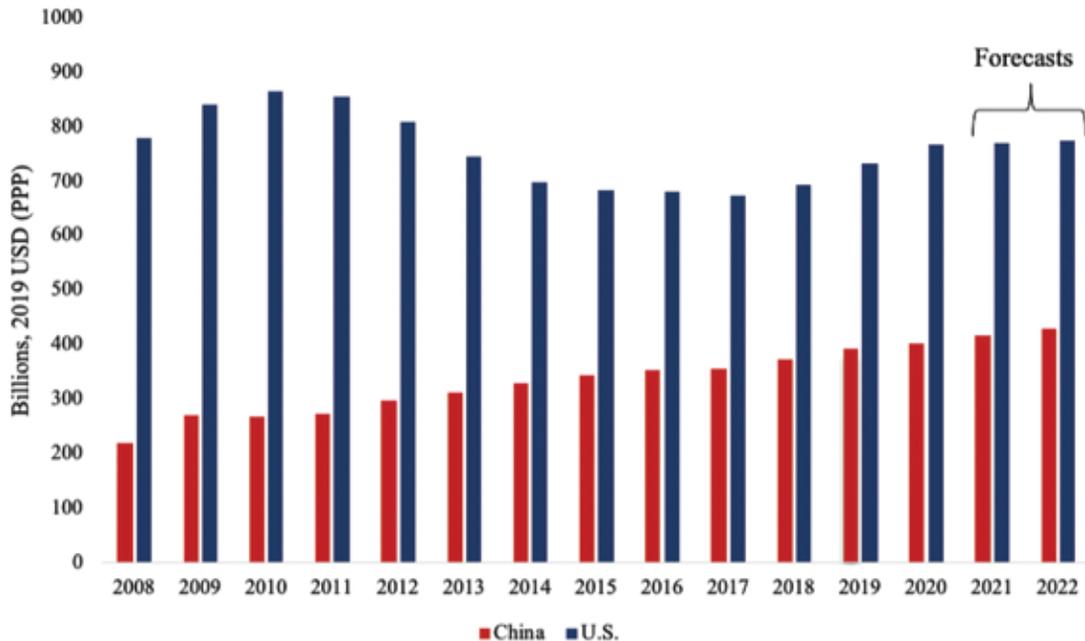
The most vexing issue in comparing defense spending is personnel costs. Because of the complexity, differences are often relegated to a footnote. But as General Milley noted pointedly in his testimony to Congress in 2018, when he was Chief of Staff of the Army, “What is not often [accounted for] is the cost of labor, and anyone who takes Econ 101 knows cost of labor is the biggest factor of production . . . we’re the best paid military in the world by a long shot. . . . Chinese soldiers [cost] a tiny fraction.”⁸¹ Milley is certainly correct. The average PLA active-duty soldier costs China one-quarter what the United States pays. DOD currently spends on average over \$100,000 per Active-duty Servicemember annually, including salary, benefits, and contributions to retirement programs.⁸² In contrast, the PLA’s budget for each of its 2.035 million active-duty personnel is on average \$28,000.⁸³

Three further differences are worthy of note. First, the U.S. defense budget pays for bases and forces to meet global commitments in Europe, the

Middle East, South America, and Asia. The United States currently maintains 750 overseas bases around the world.⁸⁴ Thus, while the U.S. Indo-Pacific Command’s area of responsibility includes half the world’s population and two of its three largest economies, its commander must compete for funding with other commanders responsible for the many other U.S. commitments.⁸⁵ China’s defense budget, by contrast, is focused on Northeast Asia.

Second, much of the U.S. acquisition budget is consumed by exquisite and expensive legacy systems dear to each of the military Services but not well designed for a potential conflict with China. The escalation in costs of these systems was captured by one of the wisest leaders of America’s defense world, Norman Augustine, in the early 1980s, when he coined what has become known as *Augustine’s Law*. According to this law, the cost of American weapons doubles every 5 years. To be even more provocative, he quipped that on the trajectory at the time, by 2054 “the entire defense budget will purchase just

Figure 3.



one aircraft. This aircraft will have to be shared by the Air Force and Navy three and a half days each per week except for leap year, when it will be made available to the Marines for the extra day.”⁸⁶ In 2010, the *Economist* reviewed what had happened in previous decades, compared it to the trajectory forecast by Augustine’s Law, and concluded that “we are right on target.”⁸⁷

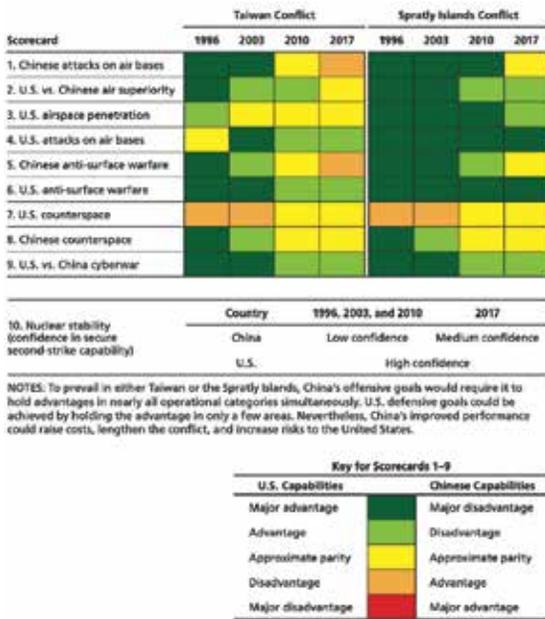
As a result, as Christian Brose has argued, in the competition with China, the United States is “playing a losing game.” While the United States has built “small numbers of large, expensive, exquisite, heavily manned, and hard-to-replace platforms,” China has developed “large numbers of multi-million-dollar weapons to find and attack America’s small numbers of exponentially more expensive military platforms.”⁸⁸ As National Security Advisor Jake Sullivan put it, “for every \$10,000 we spend on an aircraft carrier, [China spends] \$1 on a missile that can destroy that aircraft carrier.”⁸⁹

Third, for the past two decades, much of U.S.

spending has gone to wars in the Middle East and been handicapped by paralysis in Congress. As General Dunford told Congress in 2019, “seventeen years of continuous combat and fiscal instability have affected our readiness and eroded our competitive advantage.”⁹⁰

The cost of the war on terror now exceeds \$6.4 trillion, including \$2 trillion in Afghanistan.⁹¹ At the height of the U.S. troop presence in Afghanistan and Iraq in 2010, defense spending reached almost \$820 billion and 4.7 percent of gross domestic product (GDP).⁹² After the 2011 Budget Control Act introduced cuts, partisan jockeying led to delayed budgets and a government shutdown in 2013, followed by declining defense outlays for 2 years. Although spending has risen slightly since 2016, by 2020, defense expenditures constituted the lowest percentage of GDP and Federal discretionary spending since 1962.⁹³ These figures are markedly below the bottom line of 3 percent annual growth above inflation that General Dunford told Congress is the

Figure 4.



floor necessary to preserve America’s “competitive advantage.”⁹⁴

In sum, emerging from what former Secretary of Defense Mattis has called a period of “strategic atrophy,” serious American strategists have increasingly recognized the demise of U.S. military dominance and are now struggling to understand what that means for our national security and defense.⁹⁵ All agree that to restore strategic solvency in a deteriorating security landscape, the United States must find more imaginative ways to adapt.

Where Do We Go from Here?

Our objective in this article is to report the facts about where the United States and China currently stand in key races. We hope this summary of what has happened can inform the Biden administration’s strategic reviews—not anticipate their conclusions. Choices the administration and Congress will make in 2022 and beyond can significantly impact the current trajectories. But the decisions likely to have the greatest positive impact are the hardest to make

and execute. For example, as Admiral Winnefeld, former CIA Acting Director Michael Morell, and Graham Allison explained in their *Foreign Affairs* article “Why American Strategy Fails,” the legacy platforms we have, to which core groups within the military Services are committed and which are supported by congressional subcommittees and industry lobbyists, are mostly not what the Nation needs if China is the defining military challenge for the decades ahead.⁹⁶ As Admiral Winnefeld put it, the U.S. military is on a “non-virtuous flywheel . . . maintained by powerful incentives for Congress (money in Members’ districts), identity metrics for the services (ship numbers), and a lack of imagination on the part of the combatant commands.” As a result, the military is too often “merely trying harder to do the same things and demanding more resources to chase the same increasingly moribund concept (decisive mano-a-mano power projection).”⁹⁷

While we have views about the strategic choices the United States is now facing, we have made our best effort to what the old television show *Dragnet* called “just the facts.” **PRISM**

Notes

¹Readers tempted to dismiss this as a straw man should read the Trump administration's "U.S. Strategic Framework for the Indo-Pacific," which identified maintaining U.S. primacy as a "top interest"; Michael O'Hanlon's urging to "don't write off American dominance"; Max Boot's insistence that "primacy may be a drag, but it beats the alternatives"; and Ashley Tellis's assertion that maintaining primacy is "the first and perhaps most important task facing the United States today." "U.S. Strategic Framework for the Indo-Pacific," White House, declassified January 5, 2021, available at <<https://trumpwhitehouse.archives.gov/wp-content/uploads/2021/01/IPS-Final-Declass.pdf>>; Michael O'Hanlon, "China Is Definitely on the Rise. But Don't Write Off American Dominance Just Yet," *USA Today*, October 26, 2021, available at <<https://www.usatoday.com/story/opinion/2021/10/26/china-military-struggle-america-still-strong/6174577001?gnt-cfr=1>>; Max Boot, "Abandoning American Primacy Will Just Cost Us More in the Long Run," *Washington Post*, December 17, 2018, available at <<https://www.washingtonpost.com/opinions/2018/12/17/abandoning-american-primacy-will-just-cost-us-more-long-run/>>; and Ashley Tellis, *Protecting American Primacy in the Indo-Pacific*, Testimony Before the Senate Armed Services Committee, 115th Cong., 1st sess., April 25, 2017, available at <https://carnegieendowment.org/files/Ashley_J._Tellis_SASC_Testimony_April_25_2017.pdf>.

²*Summary of the 2018 National Defense Strategy of the United States of America: Sharpening the American Military's Competitive Edge* (Washington, DC: Department of Defense [DOD], 2018), 3, available at <<https://dod.defense.gov/Portals/1/Documents/pubs/2018-National-Defense-Strategy-Summary.pdf>>.

³Ibid.

⁴Kurt M. Campbell and Jake Sullivan, "Competition Without Catastrophe," *Foreign Affairs*, September/October 2019, available at <<https://www.foreignaffairs.com/articles/china/competition-with-china-without-catastrophe>>.

⁵Elbridge Colby, "How to Win America's Next War," *Foreign Policy*, May 5, 2019, available at <<https://foreignpolicy.com/2019/05/05/how-to-win-america-next-war-china-russia-military-infrastructure/>>.

⁶As the commission anticipated:

In 2024, China undertakes a surprise attack to prevent Taiwan from declaring independence. As Chinese forces launch air and missile attacks, cripple the Taiwanese Navy, and conduct amphibious landings, it becomes clear that decisive U.S. intervention will be required. Unfortunately, America can no longer mount such an intervention at an acceptable cost. China's missile, air, surface, and undersea capabilities have continued to grow as U.S. defense spending has stagnated. Large parts of the Western Pacific have become "no-go" zones for U.S. forces. The Pentagon informs the President that America could probably defeat China in a long war, if the full might of the nation was mobilized. Yet it would lose huge numbers of ships and aircraft, as well as thousands of lives, in the effort, in addition to suffering severe economic disruptions—all with no guarantee of having decisive impact before Taiwan was overrun.

See Eric Edelman et al., *Providing for the Common Defense: The Assessment and Recommendations of the National Defense Strategy Commission* (Washington, DC: U.S. Institute of Peace, 2018), available at <<https://www.usip.org/sites/default/files/2018-11/providing-for-the-common-defense.pdf>>.

⁷Robert Blackwill and Philip Zelikow, who led a high-profile study group on the topic, concluded, "We know of no credible expert who assesses that, in those last three years [since the release of the 2018 National Defense Strategy], as Chinese capabilities have advanced, U.S. defense strategy is now, on balance, more capable of performing [a conventional defense of Taiwan]." See Robert D. Blackwill and Philip Zelikow, *The United States, China, and Taiwan: A Strategy to Prevent War* (New York: Council on Foreign Relations, 2021), 43, available at <https://cdn.cfr.org/sites/default/files/report_pdf/the-united-states-china-and-taiwan-a-strategy-to-prevent-war.pdf>.

⁸James A. Winnefeld and Michael J. Morell, "The War That Never Was?" U.S. Naval Institute *Proceedings* 146, no. 8 (August 2020), available at <<https://www.usni.org/magazines/proceedings/2020/august/war-never-was>>. There has been a reluctance to state this clearly for fear of giving China a "green light," no doubt informed by Secretary of State Dean Acheson's statement in January 1950 that South Korea was outside the U.S. "defensive perimeter." But as former Deputy Secretary of Defense Robert Work has noted, China's security community has analyzed U.S. capabilities, including our wargames, more carefully than have many Americans who still want to cling to facts from a world that was.

⁹Edelman et al., *Providing for the Common Defense*.

¹⁰ Michèle Flournoy, “How to Prevent a War in Asia,” *Foreign Affairs*, June 18, 2020, available at <<https://www.foreignaffairs.com/articles/united-states/2020-06-18/how-prevent-war-asia>>.

¹¹ Demetri Sevastopulo, “Admiral Warns U.S. Military Losing Its Edge in Indo-Pacific,” *Financial Times*, March 9, 2021.

¹² Valerie Insinna, “A U.S. Air Force War Game Shows What the Service Needs to Hold Off—or Win Against—China in 2030,” *Defense News*, April 12, 2021, available at <<https://www.defensenews.com/training-sim/2021/04/12/a-us-air-force-war-game-shows-what-the-service-needs-to-hold-off-or-win-against-china-in-2030/>>.

¹³ See Lara Seligman, “U.S. Warns of China’s Growing Threat to Taiwan,” *Politico*, March 16, 2021, available at <<https://www.politico.com/news/2021/03/15/china-growing-threat-taiwan-476170>>.

¹⁴ Quoted in Brad Lendon, “China Building Offensive, Aggressive Military, Top U.S. Pacific Commander Says,” CNN, March 10, 2021, available at <<https://www.cnn.com/2021/03/10/asia/us-pacific-commander-china-threat-intl-hnk-ml/index.html>>. In June 2020, James Stavridis estimated the chances, optimistically, to be “less than 1 in 4” that China would attack Taiwan by November 2020. In 2021, as former U.S. Ambassador to India Robert Blackwill and former State Department Counselor Philip Zelikow judge, that likelihood has only increased. Blackwill and Zelikow, *The United States, China, and Taiwan*, 2.

¹⁵ Mark Milley, *Hearing to Receive Testimony on the Department of Defense Budget Posture in Review of the Defense Authorization Request for Fiscal Year 2022*, Testimony Before the Senate Armed Services Committee, 117th Cong., 1st sess., June 10, 2021, available at <https://www.armed-services.senate.gov/imo/media/doc/21-49_06-09-21021.pdf>.

¹⁶ When China’s defense spending is calculated using purchasing power parity rates, China would reach America’s current level of defense spending by 2047. It would surpass the United States by 2058. Eric Miles, commons.wikimedia.org, 06/19/2012, available at <https://commons.wikimedia.org/wiki/File:China_Military_Budget_2012.png> China Military Budget>.

¹⁷ Graham Allison, “Grave New World,” *Foreign Policy*, January 15, 2021, available at <<https://foreignpolicy.com/2021/01/15/biden-10-challenges-for-foreign-policy-economy-united-states-china/>>.

¹⁸ *Military and Security Developments Involving the People’s Republic of China 2020* (Washington, DC: Office of the Secretary of Defense, September 2020), i, available at <<https://media.defense.gov/2020/sep/01/2002488689/1/1/1/2020-dod-china-military-power-report-final.pdf>>.

¹⁹ Philip Davidson, *Advance Policy Questions for Admiral Philip Davidson, USN, Expected Nominee for Commander, U.S. Pacific Command*, Senate Armed Services Committee, 115th Cong., 2nd sess., April 17, 2018, 11, available at <https://www.armed-services.senate.gov/imo/media/doc/Davidson_APQs_04-17-18.pdf>.

²⁰ Andrei A. Kokoshin, *2015 Military Reform in the People’s Republic of China: Defense, Foreign and Domestic Policy Issues* (Cambridge, MA: Belfer Center for Science and International Affairs, 2016), available at <<https://www.belfercenter.org/sites/default/files/legacy/files/Military%20Reform%20China%20-%20web2.pdf>>; Joel Wuthnow and Phillip C. Saunders, “Chairman Xi Remakes the PLA,” in *Chairman Xi Remakes the PLA: Assessing Chinese Military Reforms*, ed. Phillip C. Saunders et al. (Washington, DC: NDU Press, 2019), 3, available at <<https://ndupress.ndu.edu/Portals/68/Documents/Books/Chairman-Xi/Chairman-Xi.pdf>>; Graham Allison, *Destined for War: Can America and China Escape Thucydides’s Trap?* (New York: Houghton Mifflin Harcourt, 2017), 129.

²¹ M. Taylor Fravel, *A ‘World-Class’ Military: Assessing China’s Global Military Ambitions*,” Testimony Before the U.S.-China Economic and Security Review Commission, June 20, 2019, 2, available at <https://www.uscc.gov/sites/default/files/Fravel_USCC%20Testimony_FINAL.pdf>; and Wuthnow and Saunders, “Chairman Xi Remakes the PLA,” in Saunders et al., *Chairman Xi Remakes the PLA*.

²² Allison, *Destined for War*, 129; Cortez A. Cooper III, “PLA Military Modernization: Drivers, Force Restructuring, and Implications,” Testimony Before the U.S.-China Economic and Security Review Commission, February 15, 2018, available at <https://www.rand.org/content/dam/rand/pubs/testimonies/CT400/CT488/RAND_CT488.pdf>.

²³ Xi Jinping, “Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era,” speech, 19th National Congress of the Communist Party of China, Beijing, October 18, 2017, available at <http://www.xinhuanet.com/english/download/Xi_Jinping%27s_report_at_19th_CPC_National_Congress.pdf>.

²⁴ Allison, *Destined for War*, 156–157.

²⁵ Defense Intelligence Ballistic Missile Analysis Committee, *Ballistic and Cruise Missile Threat*, NASIC-1031-0985-17 (Wright-Patterson AFB, OH: Air Force National Air and Space Intelligence Center, 2017), 3, available at <https://www.nasic.af.mil/Portals/19/images/Fact%20Sheet%20Images/2017%20Ballistic%20and%20Cruise%20Missile%20Threat_Final_small.pdf?ver=2017-07-21-083234-343>.

²⁶ *Military and Security Developments Involving the People's Republic of China 2020*, ii.

²⁷ *Military and Security Developments Involving the People's Republic of China 2021* (Washington, DC: Office of the Secretary of Defense, November 2021), 60, available at <<https://media.defense.gov/2021/nov/03/2002885874/-1/-1/0/2021-cmpr-final.pdf>>.

²⁸ Center for Strategic and International Studies Missile Defense Project, "DF-21 (CSS-5)," July 31, 2021, available at <<https://missilethreat.csis.org/missile/df-21>>.

²⁹ Robert O. Work and Greg Grant, *Beating Americans at Their Own Game: An Offset Strategy with Chinese Characteristics* (Washington, DC: Center for a New American Security, June 2019), available at <<https://www.cnas.org/publications/reports/ beating-the-americans-at-their-own-game>>.

³⁰ Moreover, in peacetime, this strategy imposes disproportionate costs on U.S. forces relying on exquisite missile defenses and compels U.S. strategists to plan reactions to an opponent's first move, rather than seize the initiative. See Work and Grant, *Beating Americans at Their Own Game*, 9–10.

³¹ James Dobbins et al., *Conflict with China Revisited: Prospects, Consequences, and Strategies for Deterrence* (Santa Monica, CA: RAND, 2017), 1.

³² Robert S. Norris and William M. Arkin, "Chinese Nuclear Forces, 2000," *Bulletin of the Atomic Scientists* 56, no. 6 (2000), 78–79.

³³ *Military and Security Developments Involving the People's Republic of China 2020*, ix. For an estimate of U.S. nuclear warheads, see "Nuclear Weapons: Who Has What at a Glance," Arms Control Association, October 2021, available at <<https://www.armscontrol.org/factsheets/Nuclearweaponswhohaswhat>>.

³⁴ *Military and Security Developments Involving the People's Republic of China 2021*, viii.

³⁵ *Ballistic Missile Defense Review Report* (Washington, DC: DOD, February 2010), 4, 13, available at <https://dod.defense.gov/Portals/1/features/defenseReviews/BMDR/BMDR_as_of_26AJ10_0630_for_web.pdf>; Presidential Press and Information Office, "The President of Russia Arrived in China on a State Visit," Wikimedia, 06/08/2018.

³⁶ "Joint Statement by Reagan, Gorbachev," *Washington Post*, December 11, 1987, available at <<https://www.washingtonpost.com/archive/politics/1987/12/11/joint-statement-by-reagan-gorbachev/cd990a8d-87a1-4d74-88f8-704f93c80cd3/>>.

³⁷ Christian Brose, *The Kill Chain: Defending America in the Future of High-Tech Warfare* (New York: Hachette Books, 2020), xii.

³⁸ "How the U.S. Military Fights Wars Today and in the Future," transcript, Center for a New American Security Defense Program, March 7, 2019, available at <<https://s3.amazonaws.com/files.cnas.org/documents/ANAWOW-Transcript-07MAR19.pdf?mtime=20190408162617>>.

³⁹ David Ochmanek, quoted in Richard Bernstein, "The Scary War Game Over Taiwan That the U.S. Loses Again and Again," *Real Clear Investigations*, August 17, 2020, available at <https://www.realclearinvestigations.com/articles/2020/08/17/the_scary_war_game_over_taiwan_that_the_us_loses_again_and_again_124836.html>.

⁴⁰ "How the U.S. Military Fights Wars Today and in the Future."

⁴¹ *Ibid.*

⁴² *Ibid.*

⁴³ *Ibid.*

⁴⁴ See Michael Peck, "Slaughter in the East China Sea," *Foreign Policy*, August 7, 2020, available at <<https://foreignpolicy.com/2020/08/07/slaughter-in-the-east-china-sea/>>.

⁴⁵ Brose, *The Kill Chain*, xiii.

⁴⁶ "How the U.S. Military Fights Wars Today and in the Future."

⁴⁷ Brose, *The Kill Chain*, xv–xvi.

⁴⁸ Eric Heginbotham et al., *The U.S.-China Military Scorecard: Forces, Geography, and the Evolving Balance of Power 1996-2017* (Santa Monica: RAND, 2015), available at <https://www.rand.org/content/dam/rand/pubs/research_reports/RR300/RR392/RAND_RR392.pdf>.

⁴⁹ James A. Winnefeld, "Don't Miss the Boat on High-Power Microwave Defense," *U.S. Naval Institute Proceedings* 147, no. 5 (May 2021), available at <<https://www.usni.org/magazines/proceedings/2021/may/dont-miss-boat-high-power-microwave-defense>>.

⁵⁰ Paul Selva, quoted in Jim Garamone, "U.S. Must Act Now to Maintain Military Technological Advantage, Vice Chairman Says," *Defense.gov*, June 21, 2018, available at <<https://www.defense.gov/Explore/News/Article/Article/1557052/us-must-act-now-to-maintain-military-technological-advantage-vice-chairman-says/>>.

⁵¹ Robert O. Work, “So, This Is What It Feels Like to Be Offset,” video, 27:00, Center for a New American Security, June 27, 2018, available at <<https://www.youtube.com/watch?v=U9iZyDE2dZI>>.

⁵² Work and Grant, *Beating Americans at Their Own Game*, 14. See also Elsa B. Kania, “AI Weapons” in *China’s Military Innovation* (Washington, DC: Brookings Institution, April 2020), available at <<https://www.brookings.edu/research/ai-weapons-in-chinas-military-innovation/>>.

⁵³ Joseph F. Dunford, Jr., quoted in David Ignatius, “Gen. Joseph Dunford on Artificial Intelligence and the Future of the U.S. Military,” video, 2:28, *Washington Post*, December 6, 2018, available at <https://www.washingtonpost.com/video/postlive/gen-joseph-dunford-on-artificial-intelligence-and-the-future-of-the-us-military/2018/12/06/fbc507d0-ddb1-4f45-b8b6-54d501265846_video.html>.

⁵⁴ Chuck Hagel, “Reagan National Defense Forum Keynote,” Ronald Reagan Presidential Library, Simi Valley, CA, November 15, 2014, available at <<https://www.defense.gov/Newsroom/Speeches/Speech/Article/606635/>>.

⁵⁵ *Military and Security Developments Involving the People’s Republic of China 2020*, 161.

⁵⁶ Graham Allison et al., *The Great Tech Rivalry: China vs. the U.S.* (Cambridge, MA: Belfer Center for Science and International Affairs, 2021), available at <https://www.belfercenter.org/sites/default/files/GreatTechRivalry_ChinavsUS_211207.pdf>; Martin Giles, “The U.S. and China Are in a Quantum Arms Race That Will Transform Warfare,” *MIT Technology Review*, January 3, 2019, available at <<https://www.technologyreview.com/2019/01/03/137969/us-china-quantum-arms-race/>>; “Quantum Computing and Defence,” in *The Military Balance 2019* (London: International Institute for Strategic Studies, February 2019), available at <<https://www.iiss.org/publications/the-military-balance/the-military-balance-2019/quantum-computing-and-defence>>.

⁵⁷ The announcement sent shockwaves throughout the U.S. defense community. Chinese researchers not associated with the project expressed concerns, and the author of the paper that laid the theoretical foundation for such a radar stated the company did not supply any details that would support its claim. See Nick Stockton, “Quantum Radar: Can Quantum Entangled Photons Reveal the Shape and Location of Cloaked Military Fighter Jets? Maybe, But Probably Not Yet,” *SPIE*, November 18, 2019, available at <<https://spie.org/news/quantum-radar?SSO=1>>.

⁵⁸ It is estimated that such a magnetometer could detect a submarine from 6 kilometers. No Western navies are known to have these detectors. Interestingly, the announcement vanished after the *South China Morning Post* reported that such a device could help China secure the South China Sea. See David Hambling, “China’s Quantum Submarine Detector Could Seal South China Sea,” *New Scientist*, August 22, 2017, available at <<https://www.newscientist.com/article/2144721-chinas-quantum-submarine-detector-could-seal-south-china-sea/#ixzz6WunQ99BC>>.

⁵⁹ Tarun Chhabra, Scott Moore, and Dominic Tierney, “The Left Should Play the China Card,” *Foreign Affairs*, February 13, 2020, available at <<https://www.foreignaffairs.com/articles/china/2020-02-13/left-should-play-china-card>>.

⁶⁰ Kelley M. Saylor, *Hypersonic Weapons: Background and Issues for Congress*, R45811 (Washington, DC: Congressional Research Service [CRS], October 19, 2021), available at <<https://fas.org/sgp/crs/weapons/R45811.pdf>>.

⁶¹ Robert P. Ashley, *Statement for the Record: Worldwide Threat Assessment*, Senate Armed Services Committee, 115th Cong., 2nd sess., March 6, 2018, available at <https://www.armed-services.senate.gov/imo/media/doc/Ashley_03-06-18.pdf>.

⁶² Saylor, *Hypersonic Weapons*, 14; John A. Tirpak, “The U.S. Is Playing Catch-Up on Hypersonics. Here’s How,” *Air Force Magazine*, March 25, 2021, available at <<https://www.airforcemag.com/the-u-s-is-playing-catch-up-on-hypersonics-heres-how/>>.

⁶³ Frank A. Rose, *Managing China’s Rise in Outer Space* (Washington, DC: Brookings Institution, April 2020), available at <https://www.brookings.edu/wp-content/uploads/2020/04/FP_20200427_china_outer_space_rose_v3.pdf>.

⁶⁴ Kazuhiro Kida and Shinichi Hashimoto, “China’s Version of GPS Now Has More Satellites Than U.S. Original,” *Nikkei*, August 19, 2019, available at <<https://asia.nikkei.com/Business/China-tech/China-s-version-of-gps-now-has-more-satellites-than-US-original>>.

⁶⁵ *2019 Report to Congress* (Washington, DC: U.S.-China Economic and Security Review Commission, November 2019), 16, available at <<https://www.uscc.gov/annual-report/2019-annual-report-congress>>.

⁶⁶ *Ibid.*, 15; Steve Jurvetson, “The Red Planet (China Mission to Mars),” flickr, 07/23/20..

⁶⁷ Elsa B. Kania, *Battlefield Singularity: Artificial Intelligence, Military Revolution, and China's Future Military Power* (Washington, DC: Center for a New American Security, November 2017), available at <<https://s3.amazonaws.com/files.cnas.org/documents/Battlefield-Singularity-November-2017.pdf?mtime=20171129235805>>.

⁶⁸ U.S.-China Economic and Security Review Commission, *2019 Report to Congress*, 136.

⁶⁹ See Kania, *Battlefield Singularity*.

⁷⁰ Work and Grant, *Beating Americans at Their Own Game*.

⁷¹ Certainly, America's wars in Iraq and Afghanistan incurred severe political and financial opportunity costs. But as retired Lieutenant General Douglas Lute, USA, who served as President Barack Obama's Deputy National Security Advisor with responsibility for Afghanistan and Iraq, reminds us, there is no denying that the past 20 years also have been for the United States a "laboratory" for improving large-scale operations, joint force employment, and coordination with allies and partners—experiences the Chinese do not have. Indeed, while People's Liberation Army forces have extensive programs and plans, they have not had actual experience in combat in a long time. Douglas Lute, correspondence with Graham Allison, July 8, 2021.

⁷² James A. Winnefeld, correspondence with Graham Allison, July 13, 2021.

⁷³ Mark Milley, quoted in Tom Porter, "Milley Says China Will Be the Biggest Military Threat for 100 Years and Warns It Is Improving 'Very, Very Rapidly,'" *Task and Purpose*, July 14, 2019, available at <<https://taskandpurpose.com/news/milley-china-rise/>>.

⁷⁴ Jack Reed, *Defense Priorities* (Washington, DC: Ronald Reagan Institute, May 11, 2021), available at <<https://www.reed.senate.gov/news/releases/defense-priorities-with-senator-jack-reed>>.

⁷⁵ Andrew F. Krepinevich, Jr., "Finding Strength in Decline," *Foreign Affairs*, December 10, 2020, available at <<https://www.foreignaffairs.com/articles/usa/2020-12-10/finding-strength-decline>>.

⁷⁶ This calculation uses official defense outlays as reported in Chinese government white papers and by Chinese state media and, for the United States, as reported by the Office of Management and Budget or allocated by the National Defense Authorization Act (NDAA). The \$178 billion figure is China's declared defense budget for 2020 when converted from yuan to dollars using the prevailing market exchange rate. The term *U.S. defense budget* refers to the budget allocated by the NDAA for fiscal year (FY) 2020. See Mike Yeo, "China Announces \$178.2 Billion Military Budget," *Defense News*, May 22, 2020, available at <<https://www.defensenews.com/global/asia-pacific/2020/05/22/china-announces-1782-billion-military-budget/>>; Amanda Macias, "Trump Signs \$738 Billion Defense Bill. Here's What the Pentagon Is Poised to Get," CNBC, December 20, 2019, available at <<https://www.cnbc.com/2019/12/21/trump-signs-738-billion-defense-bill.html>>.

⁷⁷ The Stockholm International Peace Research Institute (SIPRI) estimates that when items like military construction and retirement payments are included in China's defense spending, China's actual outlays are 1.4 times Beijing's official defense budget. See "Sources and Methods," SIPRI, available at <<https://www.sipri.org/databases/milex/sources-and-methods#sipri-estimates-for-china>>. Frederico Bartels provides another estimate of Beijing's actual spending, which he calculates is 45 percent higher than reported. See Frederico Bartels, *China's Defense Budget in Context: How Under-Reporting and Differing Standards and Economies Distort the Picture* (Washington, DC: Heritage Foundation, March 2020), available at <<https://www.heritage.org/asia/report/chinas-defense-budget-context-how-under-reporting-and-differing-standards-and-economies>>.

⁷⁸ The \$738 billion figure is the topline of NDAA FY2020 that President Trump signed in December 2019. Macias, "Trump Signs \$738 Billion Defense Bill."

⁷⁹ This calculation draws on SIPRI's calculations of U.S. and Chinese military spending. See "SIPRI Military Expenditure Database," SIPRI, available at <<https://www.sipri.org/databases/milex>>. See also *Military and Security Developments Involving the People's Republic of China 2020*, xi; John F. Sargent, Jr., *Defense Primer: RDT&E*, IF10553 (Washington, DC: CRS, October 21, 2021), available at <<https://crsreports.congress.gov/product/pdf/IF/IF10553>>.

⁸⁰ "The Big Mac Index," *The Economist*, December 2021, available at <<https://www.economist.com/big-mac-index>>.

⁸¹ Mark Milley, *Review of the FY2019 Budget Request for the U.S. Army*, Committee on Appropriations, U.S. Senate, 2018, available at <<https://www.appropriations.senate.gov/hearings/review-of-the-fy2019-budget-request-for-the-us-army>>. Consider that as the number of Active-duty military personnel fell by 64 percent from a post-World War II peak in FY1952 to its lowest point in FY2016, total personnel costs grew 110 percent in real terms. See Seamus P. Daniels, *Assessing Trends in Military Personnel Costs* (Washington, DC: Center for Strategic and International Studies, September 9, 2021), available at <<https://www.csis.org/analysis/assessing-trends-military-personnel-costs>>.

⁸² Lawrence Kapp and Barbara Salazar Torreon, *Military Pay: Key Questions and Answers*, RL33446 (Washington, DC: CRS, July 17, 2020), available at <<https://fas.org/sgp/crs/natsec/RL33446.pdf>>.

⁸³ For China, the most recent data available are the PLA's reported \$47.5 billion in personnel costs in 2017 as cataloged by China's 2019 national defense white paper (when converted from yuan to dollars using market exchange rate). The white paper defines personnel expenses as covering mainly "the salaries, allowances, food, bedding, clothing, insurance, subsidies and pensions for officers, non-ranking officers, soldiers and contracted civilians, as well as retirees supported from the defense budget." As SIPRI notes, however, this figure does not include another \$17.5 billion spent on demobilization and retirement (when converted from yuan to dollars using market exchange rate). Together, these accounts add up to approximately \$65 billion spent on personnel in 2017. That year, according to the International Institute for Strategic Studies, the PLA had 2.183 million active-duty troops. The PLA's personnel costs presumably also paid for 510,000 reservists. While the cost of a PLA reservist is unknown, in the case of the United States, Reservists can cost up to one-fifth the price of Active-duty soldiers by base salary. Thus, for a generous estimate, we calculate that the PLA spends around \$28,000 per active-duty servicemember per year—one-quarter what the United States spends. On the other hand, an American Soldier who has experienced several tours of combat is obviously different from his or her Chinese counterpart. This is the subject of one of our ongoing studies. See *China's National Defense in the New Era* (Beijing: State Council Information Office of the People's Republic of China, 2019), available at <http://www.xinhuanet.com/english/2019-07/24/c_138253389.htm>; Nan Tian and Fei Su, "A New Estimate of China's Military Expenditure," SIPRI, January 2021, 11, available at <https://www.sipri.org/sites/default/files/2021-01/2101_sipri_report_a_new_estimate_of_chinas_military_expenditure.pdf>; "Country Comparisons and Defence Data," *The Military Balance* 117, no. 1 (2017), 555; "Army Reserve Salaries," U.S. Army, n.d., available at <<https://www.goarmy.com/reserve/benefits/money.html>>; Kapp and Salazar Torreon, *Military Pay*.

⁸⁴ Katrina Manson, "Has America Had Enough of War?" *Financial Times*, May 7, 2021, available at <<https://www.ft.com/content/edfc3da2-1bdb-44c6-88ff-1458ef634a14>>.

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⁸⁸ Brose, *The Kill Chain*, xxv.

⁸⁹ Jake Sullivan, "Recent U.S. Policy Towards China Is Productive," transcript, *Intelligence² Debates*, August 2, 2019, available at <<https://www.intelligencesquared.us/org/debates/recent-us-policy-towards-china-productive>>.

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