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THE FUTURE OF PRECISION-STRIKE WARFARE

Strategic Dynamics of Mature Military Revolutions

John D. Maurer

Beginning in the 1970s, military theorists began predicting that the combination of highly accurate conventional weapons and networks of advanced sensors would transform the character of future wars radically, enabling rapid and precise attacks that would overwhelm adversaries quickly and create opportunities for decisive military success. Decades later, important parts of that vision seem to have been realized; increasingly accurate conventional weapons and large networks of sensors have enabled great powers such as the United States to dominate less-well-armed adversaries such as Iraq, Serbia, Afghanistan, and Libya in rapid military campaigns. Although most would admit that the political outcomes of those military successes were far less decisive, many analysts nonetheless predict that precision conventional weapons will continue to drive evermore-decisive conventional battles in the future, allowing the side that adopts and best employs such weapons to overcome its adversaries.[1]

The overwhelming battlefield successes of American precision weapons are undeniable, but they are not a particularly good guide for the future of precision-armed conflict. American successes reflect an immature version of the precision military revolution, in which the United States enjoyed the enormous advantage of having such weapons while its adversaries did not. As we move deeper into the twenty-first century, however, that early period of the precision conventional revolution is giving way rapidly to a more mature phase, in which the proliferation and widespread adoption of such weapons will see new dynamics largely unrelated to early U.S. military successes. Future wars between great powers very well could tend toward longer, protracted conflicts as superpowers seek to coerce each other without escalating to nuclear warfare.[2] Far from alleviating this dilemma, masses of precision conventional weapons may worsen conventional

military stalemate, with each side eviscerating the other's power-projection capabilities. We very well may be seeing a version of this sort of stalemated conflict playing out in Ukraine today.

In seeking to explore the future of precision-guided warfare, military analysts would do well to consider the historical patterns of previous military revolutions, in which the initial dominance of early adopters regularly has given way to the mature counterbalance of proliferated capabilities. Such previous revolutions at first seemed to offer unique technological solutions to long-standing military dilemmas, but as these technologies were adopted more widely, combatants repeatedly relearned that fundamental military advantages in generating mass and projecting power remained as relevant as ever in prevailing over similarly armed adversaries. Rather than degrading its overall forces in pursuit of a mythical precision "silver bullet," the United States would do better to consider how precision-strike weapons best can support the balanced armed forces required to deter and, if necessary, prevail in future conventional wars of either short or long duration.

MILITARY REVOLUTIONS, THEN AND NOW

Across the centuries, new technologies periodically have altered the character of war in dramatic fashion, a process often referred to as a *military revolution.* While historians long have studied the impact of emerging technology on war, policy-oriented study of military revolutions has a more recent origin.[3] In the 1970s, American military reformers reflecting on the nation's recent defeat in Vietnam began programs to improve the lethality and responsiveness of American conventional forces, with a much greater emphasis on exploiting munitions precisely guided by advanced sensors to disrupt and defeat adversaries on the battlefield. While militaries had been working for decades to improve the accuracy of their weapons, American military reformers first systematically sought to exploit the advantages of accurate weapons and networked sensors through programs such as Assault Breaker and new doctrinal developments such as Air-Land Battle.[4] By the late 1970s, Soviet marshal Nikolay V. Ogarkov described American military reforms in epochal terms as a *military-technical revolution* that not only would alter the balance of conventional forces in Europe but also would reshape fundamentally the character of future war by allowing the technologically superior combatant to disarm and defeat opponents in rapid and decisive fashion.[5]

The rapid destruction of the Iraqi army during Operation DESERT STORM in 1991 suggested that such Soviet predictions of a military revolution very well may have been prescient. Even as the Soviet Union itself collapsed, American strategists seeking to make sense of the emerging security environment drew on Ogarkov's theory to explore the future of military-technical development.[6] By the mid-1990s,

the concept of a military-technical revolution, or *revolution in military affairs* (RMA), had become a staple of American defense policy analysis.[7] Since that point, the pursuit of decisive military advantage through the combination of precision-guided weapons, advanced sensors, and networked command-and-control (C2) capabilities has driven much American military innovation and doctrine.[8]

However, the United States was not the only country to come away from the 1991 Persian Gulf War impressed by the possibilities of a precision-guided RMA.[9] While American strategists sought to extend the perceived advantages they had enjoyed during the Gulf War, Chinese and Russian theorists instead concentrated on the utility of advanced precision-guided weapons to *prevent* the United States from repeating 1991. China took the lead in this regard, pursuing a combination of sensors, networks, and long-range precision fires to produce an antiaccess/area-denial system that would deter and, if necessary, prevent American forces from massing on China's periphery for a decisive attack.[10] Contemporary Chinese strategists write about the need to emulate American successes in using precision-guided weapons to disrupt adversary military systems and win rapid, decisive victories.[11] Russian military thinkers also recognize the importance of long-range precision fires and advanced electronic and cyberwarfare capabilities to deter and disrupt NATO intervention along their country's borders, although poor performance in Ukraine calls into question how effectively the Russian military has pursued this capability.[12] Nonetheless, American strategists contemplating a return to strategic competition confront adversaries who share similar broad technical capabilities, operational concepts, and theories of victory.[13]

The precision-strike military revolution has entered what Thomas G. Mahnken describes as "the mature phase." In this phase, early innovations proliferate through the international system and are replicated on a large scale.[14] Critically, the maturation of a military revolution often is associated with rapid loss of advantage on the part of early adopters.[15]

The pattern of early asymmetric advantage followed by maturation and growing symmetry has repeated throughout history. Spanish armies in the early modern period used firearms, combined-arms tactics, and fiscal-military state building to dominate European battlefields—until their many rivals replicated and surpassed their accomplishments.[16] Napoléon's armies enjoyed similar advantages in operational organization and societal mobilization—until his adversaries adapted by adopting French innovations.[17] Prussia exploited railroads and telegraphs for mass mobilization in building the German Empire, but Germany could not replicate this success in the First World War against similarly organized opponents.[18] Rapid German successes in armored warfare in the opening phases of the Second World War were overcome similarly by Allied adaptation in the war's final years.[19]

THE NUCLEAR REVOLUTION

The military revolutionary process of early exploitation followed by rapid adaptation also was visible in the development of nuclear weapons. The United States took the early lead by producing the first nuclear weapons in the final days of the Second World War.[20] American leaders hoped that nuclear weapons would deter and, if necessary, defeat future aggression while the United States rebuilt the international order.[21] However, Soviet and British leaders also quickly determined to pursue nuclear arsenals to ensure their own security and status.[22]

While leaders quickly grasped the revolutionary political potential of nuclear weapons, American military strategists struggled with how to use the new weapon to achieve wartime objectives. At least initially, American military leaders conceived of nuclear weapons as an extension of their wartime bombing programs. In a future war, the United States would use its small arsenal of nuclear weapons to destroy the adversary's industrial war-making capability. If the adversary did not capitulate, the United States would mobilize its vast conventional military resources to defeat the crippled adversary on the battlefield, much as it had the Axis powers.[23] As a result, American military leaders spent the early postwar years focused on technical and operational issues related to the delivery of nuclear weapons at long distances, especially through the organization of the U.S. Air Force.[24] By investing in nuclear weapons, American political leaders hoped to offset Soviet advantages in standing conventional forces and contain Soviet influence while avoiding crippling economic and social costs at home.[25]

[M]asses of precision conventional weapons may worsen conventional military stalemate, with each side eviscerating the other's power-projection capabilities. We very well may be seeing a version of this . . . playing out in Ukraine today.

The August 1949 Soviet test of a nuclear weapon in itself did not alter fundamentally the contours of American nuclear strategy.[26] While the threat of Soviet nuclear attack was of supreme political importance, it was not clear that even the mutual use of nuclear weapons would prove decisive in a future war. The Truman administration's NSC-68 report treated the Soviet development of nuclear weapons seriously, but also observed that the outcome of a nuclear exchange was difficult to predict, and that therefore the United States needed not just a large nuclear arsenal but also the capability to fight and win a long conventional war.[27]

In their 1952 Defence White Paper, British leaders went a step further to describe the notional interaction of emerging nuclear arsenals with conventional war-fighting capabilities in so-called broken-back wars.[28] Now the early phase of a superpower war would witness an exchange of nuclear weapons delivered by manned bombers, with each side seeking to penetrate the other's air defenses. At

that point, both sides would mobilize for a conventional struggle of attrition.[29] The side that did better in the early nuclear exchange would be at an advantage in the ensuing conventional phase of the war, but the nuclear striking arm would need to be balanced against the competing priorities of air defenses, conventional standing forces, and industrial mobilization capability.[30]

Today, the idea of the superpowers waging a broken-back conventional war in the aftermath of a nuclear exchange stretches credulity, but in the prevailing political and military context of the early 1950s the idea was less far-fetched than it would seem later. The American nuclear arsenal remained relatively small in this period, and its delivery on bombers into the teeth of Soviet defenses against uncertain targets remained a precarious plan.[31] The Soviet "arsenal" was in even worse shape, with few working warheads or bombers.[32] Under these conditions, the speculation that a total nuclear exchange might not produce an immediate strategic decision was not unrealistic, nor was the possibility that the superpowers might continue fighting with residual conventional capabilities.

Whatever its merits in 1952, the broken-back-war theory of nuclear strategy was eclipsed quickly as the number and size of nuclear weapons increased dramatically. President Harry S. Truman responded to the Soviet nuclear test by authorizing the development of even more powerful fusion, or "hydrogen," weapons capable of destruction that was orders of magnitude greater than that of early fission devices.[33] The larger arsenals of more-powerful weapons increasingly were deployed not just on bombers but on long-range ballistic missiles capable of bypassing existing air defenses and striking their targets in minutes rather than hours, or even days, of flight.[34]

Plentiful hydrogen bombs on high-speed missiles made the idea of reconstituting for conventional war after a nuclear exchange increasingly fantastical.[35] As the Soviets developed hydrogen weapons of their own, by the mid-1950s American nuclear planning increasingly emphasized preemptive attack on Soviet nuclear forces to limit damage to American society.[36] By the end of the 1950s, the continued expansion of nuclear firepower called into question even this damage-limitation mission, as even a few missiles surviving a first strike would inflict unacceptably heavy retaliatory damage on the aggressor.[37]

Calls to prepare for protracted conventional warfare also faced significant political and social obstacles to implementation. Politically, Western leaders balked at the fiscal costs of preparing for *both* large-scale nuclear war and grinding conventional wars of attrition.[38] Although Truman's NSC-68 had called for widespread economic mobilization, the Eisenhower administration's New Look policy sought to bolster nuclear capabilities for deterrent purposes while de-emphasizing conventional war fighting.[39] By the early 1960s, the Kennedy administration sought to reinvigorate conventional capabilities, not to wage a grinding

war of conventional attrition but to restore flexibility of maneuver in more-limited conflicts and crises.[40] President John F. Kennedy and Secretary of Defense Robert S. McNamara's desire to curtail defense expenses led them to embrace an "assured destruction" framework in which American nuclear forces were tasked with deterring the Soviets through survival and retaliation rather than preemptive self-defense.[41] Nor did periodic attempts to prepare for postattack mobilization (or even postattack survival) meet with much enthusiasm from the public.[42]

The demise of the broken-back-war theory had profound implications for future defense planning. American leaders and military strategists increasingly predicted that future great-power wars would be short and sharp. Although American declaratory policy emphasized "strategic stability" from the mid-1960s onward, in practice the United States continued to seek ways to limit damage to itself from a nuclear attack, including developing preemptive-attack capabilities to disrupt adversary command systems and destroy hostile nuclear forces while they were still on the ground or under the water.[43] Even as American strategists grappled with the paradoxes of nuclear *deterrence,* many still concluded that in the event of a nuclear *war* the side that shot first would enjoy a major advantage, regardless of the balance of economic potential or conventional military strength.[44]

The belief that modern technology would grant the attacker an overwhelming advantage shaped not only nuclear strategy but also thinking about precision-guided conventional weapons. By the 1980s, proponents of precision-guided weapons similarly argued that aggressive and early use of such weapons would allow the United States to disrupt and defeat adversaries regardless of their economic or conventional military potential.[45] The short, sharp wars of the 1990s and the early years of the following decade seemed to confirm this potential against hostile states.[46]

Yet the parallel was never quite exact; after all, the nuclear strategists of the 1950s and '60s considered nuclear weapons decisive even against the backdrop of a "mature" revolution in which nuclear weapons technology had proliferated widely. The question remains: What might we expect in future conflicts under a mature system of precision-strike capabilities?

MATURE PRECISION STRIKE

Strategists seeking to envision a future nuclear war operated under a great handicap in that no such war ever had occurred. Thinking through the unthinkable thus required considerable imagination to identify key factors and extrapolate important trends.[47] When imagining conflict under a mature precision-strike revolution, we enjoy some advantages, including that over the last several decades several conflicts have occurred in which combatants employed precision-guided conventional weapons. Yet a common empirical challenge remains, since few if

any of our recent cases could be considered "mature" in the sense that *both* sides could disrupt the other with precision conventional strikes.[48] The use of precision-guided weapons in the wars of American primacy is akin to the use of nuclear weapons against Japan in 1945: artifacts of an early revolutionary phase that serve as touchstones for future analysis, but whose specific features are unlikely to recur in a mature, proliferated system. Russia's invasion of Ukraine provides some hints regarding the sort of conventional stalemate that might exist even on a precision-armed battlefield, although so far neither side has achieved the sort of systematic, long-range disruption of the enemy's combat system envisioned by proponents of the precision military revolution.[49] Exploring the dynamics of a mature precision conventional regime thus also requires a significant act of imagination.

Precision-guided weapons certainly have excited the imagination. From the 1991 Gulf War onward, international audiences have been given a front-row seat on the use of precision-guided munitions through the release of extensive video records of such munitions at work.[50] Their ability to strike suddenly and destroy a given target dominates public discussions. Harder to discern from the videos is the larger "back end" of such precision-strike systems, including the sensors that surveil adversaries, the intelligence process that turns sensor data into actionable targets, the aircraft and missiles that carry munitions to those targets, the command systems that coordinate these activities, and the networks that tie the entire process together.[51]

The Primacy of Disruption

Lost entirely in the dramatic videos of discrete exploding objects is the intellectual underpinning driving much of the use of precision-guided weapons, one that treats adversaries not as unitary forces to be overthrown but as systems to be disrupted.[52] Under this framework, precision-guided munitions are directed not against the bulk of the adversary's forces but against the critical nodes in its military system: the sensors, analysts, commanders, and networks that allow the adversary's military to function. Targeted disruption of the adversary system is at the heart of how major militaries prepare for precision-guided warfare today, whether it is the American Joint Concept for Access and Maneuver in the Global Commons, the Russian "active defense," or the Chinese "systems confrontation."[53] By leveraging the unique capabilities of precision-guided weapons against vulnerable nodes in the adversary's system, these major militaries seek to disrupt the adversary's ability to resist.[54] Overall, this has been a sensible approach, one validated by the significant disruption that militaries from Iraq and Serbia to Yemen and Armenia have experienced under barrages of precisely targeted attacks.

Whether such disruption will be as effective in future wars is less certain. In future conflicts between well-armed equals, not all elements of the adversary's military system will be equally vulnerable to disruption by precision conventional

attack. As a rule, large, fixed nodes in the adversary's system will remain significantly more vulnerable to precision attack than elements that are smaller, more mobile, or more easily concealed. This observation has important implications. Precision weapons are unlikely to be very effective at destroying other precision weapons once those weapons are dispersed aboard trucks, aircraft, or ships.[55] Of course, precision weapons depend on command facilities that themselves will be vulnerable to attack. Disrupting command systems will lessen further an adversary's ability to strike small, mobile, and concealed targets. But disruption of large command systems will not prevent as easily attacks on similarly large and well-known targets, which can be located ahead of time and attacked with minimal outside support.[56] As a result, belligerents with long-range precision-attack capabilities will struggle to limit the damage inflicted by similar adversary systems on their own fixed, high-value targets. The interaction between mobile and dispersed precision-attack systems will be minimal; instead, faced with disruption of its command system, each side is likely to direct its own disruptive attacks primarily against the fixed, high-value targets of the other.

Aside from major C2 facilities, the other likely class of high-value targets is the major logistical hubs. Ports, airfields, train stations, bridges, fuel-storage sites, power plants, bulk-storage facilities, and data centers represent only a few of the fixed facilities on which major militaries depend to project power and sustain combat operations.[57] Destroying or disabling these targets would impair significantly an adversary's ability to project power to or maneuver within a given theater.[58] Like large command facilities, these fixed logistical assets represent a set of targets that could be developed prior to a conflict and attacked by long-range missiles with relatively little support.[59]

When it comes to disrupting adversary forces in a major war, a final set of critical targets will be major maritime assets such as aircraft carriers and amphibious warfare groups. If major maritime assets are caught in port, they are virtually indistinguishable from other fixed targets and can be attacked with relative ease.[60] Targeting warships while they are at sea is another question. Ships operating close to adversary bases are likely to face significant threats from swarms of antiship missiles, although the volume of such attacks will drop off against ships farther at sea. As C2 functions break down, targeting of warships at sea is also likely to become much more difficult, at any range.[61] In a future conflict, we might expect an early phase of sudden destruction of major warships in port and hostile seas, followed by a significant decrease in precision-strike capabilities as major warships seek to avoid detection at sea and C2 capabilities break down.

Conflict under a mature and proliferated regime of precision strike thus will share important similarities to *and* differences from the recent past. Large arsenals of precise, long-range conventional weapons still will allow significant

disruption of adversary operations. Yet when *both* sides enjoy similar levels of precision-attack capability, the emergent conflict is unlikely to resemble the one-sided successes of recent decades. While early exchanges of precision-guided weapons might remove critical mobile assets such as major warships, neither side is likely to destroy entirely the other's dispersed and mobile precision-attack capabilities. As a result, each side is likely to default to attacks on fixed, high-value targets such as C2 facilities and logistics hubs in an effort to disrupt military operations further. Mutual attack on vulnerable C2 systems will create a self-reinforcing cycle of ever-decreasing ability to attack dynamic, mobile targets. At the military-operational level, conflict between mature precision-strike systems is likely to produce a form of mutual disruption.

The Challenges of Coercion

For all their disruptive potential, precision weapons have not altered the strategic challenge of linking battlefield successes to larger political objectives. The fundamental question for the mature precision revolution will be how to exploit wartime disruption to achieve larger strategic effects and political objectives. Exploiting the adversary's disarray will be much harder under a mature precision revolution in which one's own major forces have been disrupted similarly. We should suspect that conventional conflicts under the mature precision revolution will face high risks of protraction and attrition.

Few would predict a precision conventional stalemate, given the "mystique" that currently surrounds precision weapons and their supposed ability to win wars quickly and decisively.[62] That mystique, built over decades of precision-weapons use against less-well-armed adversaries, may be the greatest strategic asset of the precision-strike regime. The threat of overwhelming disruption through precision attack has exercised a strong deterrent effect on conventional conflict since the 1991 Gulf War. In 1996, the American deployment of aircraft carriers to East Asia headed off a crisis between mainland China and Taiwan.[63] Several years later, Russian leaders backed down in the face of large-scale precision attacks on Serbia.[64]

Today, Chinese and Russian development of their own precision-attack capabilities is creating serious doubts about American power-projection capabilities, suggesting that the deterrent effect of an opponent's potential conventional precision attack remains strong.[65] We can hope that the latent threat of precision conventional attack will continue to restrain great-power war in the future. Bolstering precision-strike capabilities to reinforce conventional deterrence is thus a sensible policy.[66]

Should deterrence fail, though, the mystique of precision attack will fade quickly, because precision-attack capabilities have not resolved the challenges of coercing an adversary in wartime. States occasionally rely on "brute force" to

seize what they want, but in most cases war termination involves coercing an adversary into political concessions—that is, threatening what they value to get them to accede to one's demands.[67] The theoretical requirements of this compellent coercion are well-known; the coercer must combine the ability to hurt an adversary with the willingness to do so, and then communicate that capability and credibility to the adversary in a way that is convincing.[68] In practice, wartime compellence is difficult to achieve. Combatants struggle to discover and attack what the adversary values.[69] Adversaries take countermeasures that weaken the effectiveness of coercive tools.[70] Credibility is even more difficult to measure.[71] Political leaders place restraints on the use of force to avoid escalation or domestic backlash.[72] Leaders and publics respond to violence with anger, complicating efforts to assess the "rational" value of the political stakes.[73] Nor is communication any easier. The divergent worldviews of leaders make it difficult for them to communicate effectively.[74] Leaders have strong incentives to avoid wartime bargaining out of fear of encouraging the adversary further.[75] These many barriers to effective compellence mean that states often struggle to link their destructive battlefield capabilities to quick political successes.

In a future conflict, we might expect an early phase of sudden destruction of major warships in port and hostile seas, followed by a significant decrease in precision-strike capabilities as major warships seek to avoid detection at sea and C2 capabilities break down.

Precision-strike capabilities do little to alleviate these obstacles to wartime coercion. Precision-strike capabilities do offer greater ability to destroy a given set of targets quickly, but they do not provide any greater insight into which targets should be struck, nor do they invalidate the ability of the adversary to take countermeasures by hardening, concealment, or dispersion.[76] Precision-strike capabilities do little to alter the balance of interests over a given political issue, and on the margins they may complicate making credible threats by undermining public tolerance for casualties, as publics become accustomed to conflicts featuring very low collateral damage.[77] Precision strike contributes little to avoiding misunderstandings or incentivizing early peace negotiations, especially if disruption of adversary leadership and communications renders prompt negotiations harder.

The early precision conventional revolution confirms the continued challenges of compelling an adversary in wartime. American precision attacks were insufficient to coerce Saddam Hussein into withdrawing from Kuwait in 1991; only after American ground forces engaged their Iraqi counterparts did Hussein order a withdrawal from the occupied territory.[78] American coercive attacks on Serbia in 1999 did produce results, but only after many months of bombardment and Serbia's growing diplomatic and economic isolation.[79] Precision conventional

disruption enabled the American invasions of Afghanistan and Iraq in 2001 and 2003, respectively, where the objective was not compellence but regime change through ground invasion.[80] Israel struggled to coerce Hezbollah in 2006.[81] NATO's efforts at coercing Libya in 2011 resulted instead in the destruction of the Gadhafi regime.[82] Saudi-led air efforts have failed to coerce Yemen's Houthis into surrender.[83] Russia's ongoing campaign of striking Ukrainian energy infrastructure has not yet produced better results.[84]

Recent history also points to several other limits on conventional precision coercion in future wars. First, defenders can repair targets that have been damaged, so repeated reattacks are required to ensure that those targets remain out of operation.[85] Second, attacking each target with multiple weapons means that precision conventional strikes require *many* precision weapons. Even forces operating in permissive environments have run short repeatedly of critical precision weapons.[86] Third, future conflicts are likely to place a premium on conventional attack over very long ranges, the better to disrupt adversary command and logistical capabilities quickly. Yet sharp opportunity costs still exist between a weapon's range and its volume of fire, as long-range weapons are much more expensive than shorter-range ones.[87] When considered together, the high tempo of operations combined with the scarcity of long-range strike assets suggests that the coercive capabilities of precision-strike systems will decline dramatically after an initial burst of violence, as magazines are depleted and damage is repaired. Yet in coercion theory, it is the prospect of *future* violence that compels an adversary's capitulation. While an initial exchange of precision conventional weapons would be tremendously disruptive, the rapidly diminishing returns on precision attacks pose a further barrier to effective coercion.

If coercion remains difficult, how will states use their disruptive precision attacks to accomplish specific wartime objectives? The critical variable in future conflicts under a mature precision-strike regime will be *time.* Disruptive precision-strike capabilities will be a wasting asset. Magazines will be depleted quickly, command and control will degrade rapidly, and adversaries will adopt more-effective countermeasures and repairs. The critical strategic question for future precision conventional conflict will be how to use this initial burst of disruption to support other lines of effort that achieve military and political objectives.

One possible answer is the *fait accompli,* a conflict scenario in which a party uses its conventional-attack capabilities to disrupt an adversary's response while it physically seizes a key piece of territory through a brute-force attack, in which no coercion is required.[88] Once ensconced in its new terrain, the aggressor can seek to deter the adversary from responding with a counterattack.[89] The fait accompli concept provides a road map for integrating long-range precision fires to accomplish larger political-military objectives, and it has the virtue of emphasizing the

strengths of precision strike in disruption and deterrence while avoiding a dubious reliance on rapidly compelling an adversary to surrender through bombardment.

Yet employing precision conventional fires to support a fait accompli strategy also poses serious risks. First, it assumes that the aggressor will be able to disrupt defenders for a sufficient duration to achieve its brute-force objectives. Such disruptive attacks are unlikely to prevent a similarly armed adversary from retaliating with disruptive precision attacks of its own. In a world of mature, proliferated precision-attack capabilities, the aggressor not only must disrupt the defender but also must project its own power to seize terrain in the face of the defender's retaliatory disruption—a difficult proposition. Some operational concepts aimed at defeating fait accompli strategies emphasize the need for the defenders to adopt their own disruptive attacks. For example, the American Air-Sea Battle concept sought to respond to Chinese antiaccess capabilities with the ability to launch deep, disruptive strikes on Chinese forces in the opening moments of a conflict.[90] If the aggressor causes only mutual disruption, its bid to seize contested territory will fail.

A second challenge to the fait accompli approach is the need to overcome local defenses, which themselves will be enhanced by precision-attack capabilities. While long-range weapons will remain few and far between, shorter-range precision artillery and rockets will be considerably more plentiful. The aggressor's forces will need to prevail in this increasingly hazardous close fight as well. Other analysts therefore have recommended countering a fait accompli by bolstering the "blunt forces" that the adversary must overcome to accomplish its brute-force grab.[91] This challenge was graphically demonstrated in the difficulties Russian forces faced in seeking to seize Kyiv in early 2022, as their initial offensives were ground down by Ukrainian unmanned aerial vehicles and man-portable antitank fire.[92] If the aggressor cannot overcome local defenses, then its fait accompli will fail.

Finally, a fait accompli strategy also must deter the defender from mobilizing a larger counterattack once the initial disruption fades. A major conventional attack (including disruptive precision strikes) would make reestablishing deterrence difficult. First, once attacked, the defender is likely to respond with anger, which could make an immediate bargain difficult.[93] Second, the defender will have strong incentives to avoid immediate negotiation, to keep from "rewarding" further aggression.[94] Third, conventional precision forces, once used, are likely to lose some of their deterrent mystique, especially as the defender recovers and reconstitutes its forces from the initial wave of strikes. Fourth, a defender might escalate the conflict horizontally, including by conducting indirect attacks—for example, by striking in distant theaters or mounting a distant blockade. Some analysts have recommended pursuing such indirect options to enable horizontal escalation in future conflicts and thereby to defeat fait accompli.[95] All of that assumes that the aggressor's initial disruption and power projection go perfectly;

reestablishing deterrence will be even more difficult if the defender can blunt the aggressor's attempted seizure of territory.

Even a fait accompli strategy may struggle in a world of mature and proliferated precision-strike capabilities. The decisive element of such a campaign would not be the precision weapons themselves but rather the ability of the aggressor or defender to project power conventionally to seize or defend terrain. Widespread proliferation of precision conventional weapons will make such power projection considerably more difficult *for both sides.* While having an advantage in precision-strike systems will be useful, the real deciding capability will remain the ability to project power over and against the adversary's precision capabilities.

For example, while Azerbaijan accrued significant attention for its use of precision conventional weapons in its September 2020 conflict with Armenia, in fact Azerbaijan's victory came from its growing ability to seize terrain even in the face of withering Armenian counterfire. Only as Azerbaijani forces encircled the regional capital of Shusha were Armenian leaders compelled to concede disputed terrain.[96] Precision fires were a critical enabler of Azerbaijan's success, but the ability to project power despite Armenian resistance proved decisive. Similarly, while Russian forces struggled to reach Kyiv in the spring of 2022, by the fall of that year Ukrainian forces were able to retake territory from the Russians through fairly traditional but highly effective combined-arms maneuver.[97] Despite the growing proliferation of precise conventional weapons, militaries continue to be "shocked" by the continued relevance of traditional war-fighting competencies.[98]

As precision conventional weapons proliferate, accomplishing political objectives and terminating even relatively small conflicts will become much more difficult. Far from the early vision of decisive warfare, the world of the mature precision conventional revolution is likely to be marked by military stalemate. The real beneficiaries of the precision revolution will not necessarily be those with the most accurate weapons but rather those who are best able to continue operating in the face of adversary bombardment.

A NEW BROKEN-BACK SCENARIO

What might a protracted conflict between two well-armed adversaries look like in an era of mature precision conventional weapons? Recent wars in Nagorno-Karabakh and Ukraine provide some hints, although less than might have been expected, given the surprising underperformance of the Russian military in Ukraine.[99] Yet no one should conclude from Russia's failures that future conflicts will be any easier for other countries, even the United States.[100] Real conflict between mature precision-strike regimes remains in the future.

One situation in which mature precision-strike warfare might yet occur is a future large-scale conflict between the United States and China. While imagining

such a war is necessarily speculative, it also provides an opportunity to identify underexamined elements of the mature precision revolution for further analysis. It is here that the broken-back-war theories of the early Cold War are of greatest use. To focus on conventional capabilities specifically, we also will assume for the moment that neither side quickly employs nuclear weapons or collapses economically.[101] What might such a protracted conventional war look like?

Much would depend on the specific political pathways to conflict, perhaps over Taiwan, but for our purposes a *large* war between the United States and China is likely to escalate rapidly into a predictable pattern of massive precision conventional exchange. Both the United States and China currently trumpet operational doctrines that emphasize early and massive use of disruptive attacks. Yet such a large-scale exchange is unlikely to prove decisive.[102] Neither side would be able to prevent the other from launching devastating disruptive attacks. Consequently, both sides' command and logistics capabilities would be degraded severely. American and Chinese naval forces in the theater, especially large platforms such as aircraft carriers and major amphibious vessels, might be sunk in rapid succession. Yet these destructive and disruptive attacks by themselves would not bring an end to the conflict. With much of its amphibious capability destroyed, China would be unable to seize Taiwan immediately, but Chinese leaders, having rolled the iron dice, would be unlikely to back down quickly. Similarly, American leaders would find it difficult to back down after so large a Chinese attack on American forces.

The mass of ships, planes, and soldiers still will be important in future conventional wars, regardless of how advanced missiles or sensors become.

Examinations of a future U.S.-China war over Taiwan sometimes end at this point, with the United States having "succeeded" in preventing a Chinese invasion of the island. But if neither side could coerce the other into acceptable terms, what would happen next? Such a protracted conflict might go through several phases. In the immediate aftermath of such a massive exchange of precision fires, the ongoing battle would have to be fought by residual "forces in being"—those legacy conventional systems that were not priority targets during the initial exchange. Smaller surface combatants, surviving submarines, and remaining tactical aircraft with shorter-range bombs and missiles would be the immediate platforms of choice, for their ability to project power over at least short distances. China might enjoy tactical and operational advantages in such a postattack environment around Taiwan, given its large fleet of small combatants and many air bases within reach of the island. The mainland regime might adopt a coercive strategy against Taiwan of blockade and bombardment, which the United States would find difficult to counter. Yet, given the challenges of previous coercive

campaigns, it also seems unlikely that a cobbled-together coercive approach would cause Taiwan to capitulate quickly, any more than Russia's drone bombardment has compelled the surrender of Kyiv.

Since residual forces in theater would not be sufficient to prevail, we would expect each side to rush additional major forces into the conflict zone. For example, not every American aircraft carrier would have been in the western Pacific when the war began; even if every carrier in the theater were destroyed in a Chinese first strike, the United States still would have strategic reserves. China also might have surviving naval forces that had not participated in the attempted invasion. The same would be true for other power-projection capabilities, including headquarters units, sensor systems, tankers, and amphibious transports. With command systems degraded and magazines depleted, these forces might even meet in larger, more-conventional battles later. In the short term, this "reconstitution" phase likely would benefit the United States, which retains significant depth of capability deployed around the world on which to draw. However, the balance of forces in theater could swing very unpredictably, as it did in the Pacific naval confrontations of the Second World War prior to the arrival of new American warships in 1943.

As rear-echelon conventional capabilities streamed forward from outside the theater, each side would be under tremendous pressure to reconstitute its precision conventional capabilities as quickly as possible. The value of long-range missiles would be less than at the start of the conflict when command networks and sensor systems were relatively intact, yet such weapons would remain potent when and where they were available. As new major forces surged forward, their operations would be punctuated by periodic "surgical" precision attacks on key command and power-projection systems. If one side were able to produce new long-range missiles at a significantly higher rate than the other, it would enjoy a marginal but important advantage in a protracted conventional war. Yet continued "sniping" at major power-projection assets likely would not produce much of an advantage one way or the other; instead, it could serve to protract the conflict further.

If a conventional conflict became truly protracted, we would expect the logistical capabilities of the combatants to be tested significantly. For example, we might assume that China would leverage its immediate local superiority in short-range tactical aircraft to pursue a steady conventional bombardment of Taiwan, in hopes of coercing the island into surrender. Yet such an air campaign would pose unprecedented challenges for the People's Liberation Army (PLA) in sustaining a high sortie rate in the face of growing crew and equipment fatigue. In a contested environment, both sides would struggle to sustain high-intensity combat operations over long periods at sea and in the air. The United States might enjoy some advantages in longevity of force, given its greater experience operating at higher tempos abroad. Yet over a long time horizon, the end result could be a "medium

intensity" conflict in which longer periods of reconstitution of forces would be punctuated by sudden bursts of high-intensity fighting as remaining forces struggled to come to blows and sustain themselves materially away from home.

If a conventional conflict lasted so long that significant attrition occurred in major rear-echelon forces, it might reach a "kitchen sink" phase in which systems are repurposed from other missions or entirely improvised forces are stood up. The result would be many square pegs pushed into round holes, so long as the square pegs were plentifully available. For example, even if all its major amphibious vessels were destroyed, a sufficiently desperate PLA might attempt another invasion of Taiwan using large civilian vessels. Such an attack would be suicide against a well-prepared defense, but after a protracted campaign of attrition it might produce results. On the other hand, the United States might enjoy unexpected advantages of its own. The war in Ukraine has demonstrated the potential of even relatively nonstealthy unmanned aerial vehicles in higher-end conventional conflicts. Long-range drones such as the MQ-9 could present a serious conventional capability over the Taiwan Strait if the PLA began to run short of longer-range surface-to-air missiles. Anything that is relatively cheap and previously stockpiled would be most useful to protract the fighting. As the quality of systems degraded, we again would expect that China's proximity to the field of battle would become more relevant in determining the outcome.

Beyond the kitchen-sink phase, absent a major nuclear exchange or sudden economic collapse, we would expect both sides to begin mobilizing greater industrial capability to remake war matériel. Although we cannot know what this matériel would look like, we can presume that both sides would seek to iterate rapidly on new tactics and procedures emerging from the conflict itself, much as the Allies did in deploying B-24s in conjunction with radio-direction-finding stations against German U-boats and repurposing major surface combatants as air-defense platforms to boost the volume of defensive fire against kamikazes.[103] We might guess that the sorts of things that would be produced and iterated quickly during a conflict would look more like attritable robots than large platforms such as USS *Gerald R. Ford* (CVN 78). Such a future protracted conventional war very well could spur the development of large-scale autonomous robotic warfare, much in the way that the Second World War transformed and enhanced manned military aviation. Whether and how such radical emerging capabilities would allow the combatants to project power, coerce each other, and ultimately terminate the conflict are similarly unclear, although if such innovations allowed for a cheaper volume of long-range precision conventional attacks, the result could be significant economic and social destruction on both sides, even absent nuclear use.

The above scenario, while necessarily speculative, allows us to imagine the contours of a protracted conflict under a mature revolution in conventional precision strike. From this thought experiment we might derive a few general conclusions. First, we should not expect silver bullets in future major wars between great powers. Robust, long-range, precision-strike complexes are important tools that the United States must pursue, but not to the detriment of traditional military capabilities. The mass of ships, planes, and soldiers still will be important in future conventional wars, regardless of how advanced missiles or sensors become. This is true even for "vulnerable" systems such as aircraft carriers and tanker aircraft, which in sufficient numbers will be able to absorb long-range fires while still supporting more-modest operations. While precision-attack systems make important contributions to conventional deterrence, the United States also needs significant and balanced investment in the conventional forces needed to fight and win in a postattack environment. Having the capacity to continue fighting lends credibility to the threat of activating precision-attack systems in the first place.

Second, the capacity to continue fighting in a precision broken-back war depends not just on weapon systems but on resilient command and control. Given the emphasis that the United States and its adversaries all place on disrupting enemy decision-making, we should expect that C2 targets will be a major focus of future conflict between great powers well armed with precision conventional weapons. Focus on winning an advantage in an early exchange of conventional weapons has directed attention toward the need for greater speed in military decision-making, the better to disrupt the opponent before being disrupted oneself.[104] Yet in a world of plentiful precision conventional weapons there is little reason to think that attacking the enemy marginally faster will render one's own command and control safer from counterattack. While speed of decision will remain important, it must be balanced against the resiliency and flexibility necessary to take punches to both forces and networks and keep fighting in protracted conventional conflicts.[105]

Third, nuclear weapons still matter a great deal. Because precision conventional weapons are unlikely to end future wars between nuclear-armed states quickly, we need to take seriously the possibility of major *protracted* conventional war. Yet such a war carries significant risks of nuclear escalation, as the increasingly desperate phases of the protracted scenario laid out above should make abundantly clear. A robust nuclear deterrent becomes all the more important as a backstop against devastating adversary escalation. Furthermore, superiority in strategic nuclear weapons would provide additional coercive leverage in future conflicts, whether those weapons are employed in strikes or not. Even as it pursues advanced precision conventional weapons, the United States should seek to retain as much strategic nuclear advantage over rivals as possible. An effective

competitive strategy combining force modernization with arms limitation can help to sustain American strategic nuclear advantages and thus reinforce both nuclear and conventional deterrence.[106]

Fourth, allies matter—a lot. For simplicity's sake, the above scenario intentionally ignores security partners other than Taiwan. Yet allies matter immensely in such a conflict. To the extent that they have their own precision-strike systems, allies allow for longer initial disruption of the adversary's efforts. Even without their own precision-attack systems, allied legacy conventional forces still would be tremendously important in a postattack environment, in which the value of small surface combatants and tactical aircraft will increase rapidly. In a protracted conflict, even allies who arrive late can provide valuable resources to sustain the fight, including functioning command and sensor capabilities, as well as combat forces that avoided the initial major precision exchange. Finally, allies or partners, even if they do not fight at all, can provide important coercive leverage. In a postattack environment, both the United States and China would have to make quick decisions about drawing down forces elsewhere to move them into the main theater of operations. The very existence of partner forces in other theaters, whether it be Indian forces on the Chinese border or Russian forces in eastern Europe, would generate increasing pressure on American and Chinese leaders to cut their losses and find some exit ramp short of total conventional or nuclear devastation.

Having the capacity to continue fighting lends credibility to the threat of activating precision-attack systems in the first place.

Fifth, the United States should look to its defense industrial base, and not just for the sake of long-term competition. The need to surge production of munitions to meet future security needs is hardly a novel observation, but the fact that so few options for conventional war termination exist throws into sharp relief the need both for large stockpiles of shorter-range munitions and for the ability to rebuild longer-range forces as quickly as possible once they are fired. The war in Ukraine has highlighted this issue, as the United States draws down stocks of shorter-range precision weapons to support Ukrainian forces; a future high-intensity precision conflict would place even greater demands on even scarcer resources, such as long-range cruise missiles. Similarly, the United States might give more thought to what sorts of cheaper, long-legged capabilities might be most useful in a future broken-back conventional environment in which major power-projection capabilities have been neutralized, yet armed conflict continues. It could be that some systems not fit for the initial phases of a high-intensity conflict—for example, slower, nonstealthy drones—might become more useful once high-end sensors are degraded and magazines empty. Here, too, allies and

partners are likely to be important as sources of matériel, including munitions, in the event of longer-term combat operations. If the mass of forces still matters in combat, then mass industry (however conceived) remains a crucial enabler of that battlefield mass.

The idea that the mature nuclear revolution might feature broken-back wars rapidly was rendered obsolete by the overwhelming firepower of thermonuclear weapons. As the size and number of American and Soviet nuclear weapons increased, the idea that either superpower would mobilize beyond the first few days or even hours of a nuclear conflict became increasingly difficult to accept. Thus, the idea of protracted conventional conflict following massive nuclear disruption was abandoned in favor of strategies emphasizing the importance of preemptive damage limiting attack and survivable second-strike forces.

Although it was a poor fit for the mature nuclear revolution, the idea of a broken-back war has significant resonance when considered against the maturing revolution in precision conventional weapons. Like nuclear weapons before them, precision conventional systems offer unparalleled opportunities to attack and disrupt an adversary's operations. Unlike nuclear weapons, however, precision conventional weapons lack the overwhelming firepower to annihilate entire societies. Thus, as precision conventional weapons mature and proliferate, we very well could see renewed conflicts marked by mutual precision disruption and violent stalemate, in which combatants struggle to amass the military resources to prevail in a protracted conventional conflict. Broken-back-war theory predicts that under such circumstances the initial exchange of "revolutionary" military weapons is less likely to be decisive than the larger structural ability to continue fighting conventionally after such an exchange has occurred. The war in Ukraine may be a preview of such protracted conflict.

Precision conventional weapons offer a new and important military tool, and the United States should do what it can to stay ahead of adversaries in this critical capability. But the pursuit of precision-guided dominance cannot come at the expense of larger military capabilities, conventional and nuclear, necessary to deter conflicts with peer competitors and, if necessary, to prevail in them. Precision conventional strikes by themselves do not win wars. They did not do so in the era of American precision dominance, and they are even less likely to do so in a future characterized by widely proliferated precision-strike systems. The critical question for future conflict will remain how to leverage the advantages of precision conventional weapons while also preserving the capability to fight and prevail in conventional conflicts, short or long. That deep ability to fight and win major wars through the integration of many different capabilities will serve as the strongest possible conventional deterrent in a renewed era of strategic competition.

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