**Understanding the current US approach to artificial intelligence (AI) has less to do with how AI is currently being used in the military domain than it does with how the United States is approaching the rise of China, and the policy choices to which this framework leads. US apprehension about China's advancing economic and military capabilities has catalysed efforts not only to integrate AI-enabled technologies into the US defense enterprise, but also to use tools of economic statecraft to stymie China's ability to do the same. It is impossible to predict whether these efforts will succeed in endowing the United States military with technological superiority over China's People's Liberation Army, but the repercussions of the attempt for the overall US-China relationship are serious and likely to be long-lasting.**

# Artificial Intelligence, Geopolitics, and the US-China Relationship

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**"The nation that dominates the information processing field will possess the keys to world leadership" – *Robert Kahn, Director of the Information Processing Techniques Office of the Defense Advanced Research Projects Agency, circa 1983.***

There are very few forces, if indeed there are any, in international politics, which are meaningfully new, rather than variations on historical theme. Societies, states, and nations coalesce, form governments that structure life, and then are afflicted by disease, natural disaster, and war until a sufficient accumulation of events catalyses revolution and forces reconfiguration into the next version of society, state, and nation. In this era of modernity, the period between event and system transfiguration has been markedly generative: the experience of disease has invigorated scientific effort devoted to curing and to preventing it and the experience of natural disaster has invigorated scientific effort devoted to predicting and defending against it. The experience of war also has invigorated scientific effort, albeit with the unfortunate result of making it more destructive and less controllable.

What is today called artificial intelligence, or AI, has since the 1950s been increasingly central to each of these throughlines. The quest of artificial intelligence is to create machines with the same kind of intellect as humans. The quest thus far has failed, but its failures have come in the form of machines that surpass human capabilities in sensing and measuring the material world; in capturing, storing, and processing observations of the material world; and in computational power and speed in analysing the material world. These machines endow humans with more and greater ability to acquire information about the context within which they exist than ever before and, as

a result, they enhance the ability of societies, states, and nations to distinguish between behaviors that are likely to aid them in achieving their goals, and those that are not. Governments therefore unsurprisingly have become acutely concerned not only with how applications of AI can aid in their own endeavors but also with how those applications might aid in the endeavors of others.[1]

This is especially true of the United States and China today. American national security practitioners and analysts worry about the strategic implications of China's military modernisation, visible in its acquisition of new assets – aircraft carriers, naval vessels, and missiles – and also about its reconceptualisation of warfare as "systems confrontation". This change in Chinese military doctrine replaces an understanding of war as a contest to destroy hardware with an understanding of war as a contest to control information. Technologies enabled by artificial intelligence thus are central to the People's Liberation Army's (PLA) modernisation, a fact that makes the rate at which China is making progress developing AI a matter of great concern to U.S. defense policymakers and planners. Whether its responses fit the traditional model of arms racing, or not, it is nevertheless the case that the United States are taking measures with the intent of advancing their own AI-enabled military capabilities while impeding China's ability to do the same.

## U.S. INTEREST IN MILITARY APPLICATIONS OF ARTIFICIAL INTELLIGENCE

While many of the professionals working within the disciplines of AI do so in service of the quest for manufactured intellect, or in service of bettering the human condition, the direction and tenor of political interest in AI has never been benign. US government investment in AI research was born with a purpose during the Second World War, and it was reared with similar intent during most of the US-Soviet Cold War.[2]

So it is today, with US practitioners and analysts of national security highly attuned to the geopolitical implications of AI, and in particular to its potential as a means of ensuring US military-technological

In the AI race, the military advances of concern are not only undefined but in fact are unknown; there is uncertainty about which technologies, and which applications of those technologies, will prove militarily useful.

superiority. Attention to the possible military applications of AI thus has been on a growth trajectory since 2010, and substantively wide-ranging. The U.S. Department of Defense has sought to incorporate AI-enabled technologies, for example, for purposes of talent management, decision support, predictive maintenance, and target recognition – the latter of which made the role of AI in national security a matter of open public debate.[3]

For this reason and others, the Department of Defense (DoD) also has been attentive to the ethical implications of AI in the military domain. Indeed, the DoD was the first national defense enterprise to adopt ethical principles for the development and use of military applications of AI, a model that other states and the North Atlantic Treaty Organization (NATO) have subsequently followed.[4] Understanding the current US approach to AI, however, has less to do with how AI is currently being used in the military domain than it does with how the United States are approaching the rise of China, and the policy choices to which this framework has led.

## Artificial Intelligence and Military Capability in China

U.S. apprehension about China's economic, political, and military development is driven by advances in the capabilities of the People's Liberation Army that date from the early 1990s. In the modern era, China's military posture has been determined primarily by its perception of the requirements for direct defense of the Chinese Communist Party (CCP) and the homeland, and for the prosecution of a militarised invasion of Taiwan in the event the island were to declare independence.[5] The possibility of US involvement in a Taiwan contingency has therefore been a driving factor in the PLA's understanding both of the need to modernise, and of the kind of modernisation needed.

The catalyst for the fact and the direction of China's military modernisation was its internalisation of lessons taken from the precision and mobility capabilities the United States used to great effect in the 1991 Gulf War. Over the subsequent three decades this display – reinforced by demonstrations of US military capability in the allied air campaign over Yugoslavia, its intervention in Afghanistan, and the

return to Iraq in 2003 – activated China's long-standing anxiety about defending the homeland, fears exacerbated by recurrent tensions with the United States over Taiwan's status. All together, the effect was to convince China that the demands of prosecuting a local war with the United States would require a fundamental reconfiguration of the PLA from being mass-based in strategy, doctrine, and force structure to being organised, trained, and equipped to conduct "systems confrontation".[6]

The motivating idea of systems confrontation is that seeking mass destruction of an adversary's military capabilities is no longer either necessary or efficient. Brute force operations focused on attriting hardware not only are constrained by the demands of geography and the limitations of physics, but also discount the opportunities modern technologies afford to attack adversary systems both from the outside in, and from the inside out.

Systems confrontation does not imply that China will forgo kinetic attacks on warfighting platforms – it is not indicative of a movement toward futuristic, entirely virtual, and bloodless war. To the contrary, the PLA's investments in its air, sea, and launch assets are to be coupled with increasingly sophisticated intelligence, surveillance, and reconnaissance (ISR) satellites, communications systems, and IT architecture to deliver munitions rapidly and with precision.

Systems confrontation thus is highly dependent upon centralisation of data, coordination of action, and rapid execution – on, that is, AI-enabled capabilities. In addition to its well-documented acquisition of military platforms[7], therefore, China has also invested substantially in networks that ingest, process, and deliver large volumes of data for use in wartime operations and decisionmaking, has advanced its ability to use AI to effect sophisticated cyber attacks, and has reorganised its command structure to exercise control over both tasks.[8]

## Artificial Intelligence and US Technology Policy

Although the PLA's modernisation has intensified US interest in developing AI for military use, efforts to do so have been a feature of US

defense policy – albeit one that has waxed and waned in intensity – since the Second World War. The U.S. Defense Advanced Research Projects Agency (DARPA) has shepherded AI research and development (R&D) since the 1960s, and the RAND Corporation – one of America's earliest defense R&D centers – designed and first used AI (called "knowledge-engineering" at the time) for military planning in the late 1970s.[9]

Such work didn't disappear, but efforts and outcomes slowed during the roughly three-decade "AI winter" that followed, as incremental advances proved inadequate to energise meaningful federal outlays.[10] DARPA, consistent with its risk-acceptant ethos, did remain active in developing new computing-enabled weapons systems and in funding the technology base needed to support them. In 1983 it launched the decade-long one billion US-Dollar Strategic Computing (SC) program to sustain activity in hardware and software development.

Initiated before the Soviet collapse the SC program was sustained after it, because of ongoing concern with Japan's economic power and especially with its considerable investments in computing. The work funded by DARPA is the basis not only for today's autonomous defense platforms and sophisticated battle management systems, but also played a foundational role in the development of the advanced semiconductor industry upon which AI-enabled technologies – military and commercial alike – rely.[11]

Nonetheless, beyond the SC program the combination of the softened security environment, anxiety about Japan, and disappointment within the United States about the extent to which the abstract promise of AI was being delivered in reality caused both a decline and a shift in the commitment of national funds to AI R&D.[12] With little reason to believe the quest for machines with human intellect was making progress and without the Soviets to race against for military advantage, technologies with commercial applications became a more appealing investment.

This appeal was not confined to the US government – quite the contrary, in fact, and as early as 1985 the domestic US computing industry was estimated to have spent one billion US-Dollar on internal efforts to develop useful, marketable, applications of AI. During the

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late 1980s and throughout the 1990s commercial technology companies proliferated, and this competition led to substantial gains in the power and performance of computer hardware and increases in the sophistication of its software, the structured set of deductive logic-based instructions by which computers completed their tasks.[13]

During the early 2000s, progress in hardware was accompanied by the proliferation of the internet and an explosion of activity on it. Internet use quickly generated such volumes of readily available data that a new paradigm for software programming became possible. With the benefit of being data-rich, AI applications now could be designed using learning-based models that expanded the universe of applications for which, and the extent to which, computers could be useful. Indeed, by the 2010s gains in hardware and software together meant that machines had become dramatically better – better than before, and better than humans – at making identifications and predictions about observations from the real world. From physical signatures like temperature, sound, light, and so forth, but also and importantly now from written and spoken language, and digital images. These improvements in AI became a source of enormous economic productivity – and they predated by just a short number of years the emergence of geopolitical tension between the United States and China, and its resultant intrusion into the technology sector.

By the 2010s, Beijing's confidence in the PLA's capabilities had grown, and it became more active in China's surrounding seas. This did not go unnoticed by the United States. To the contrary, between 2014 and 2017, a group of high-level officials in the U.S. Department of Defense used the PLA's activities and material advances as means of reinvigorating the idea that the United States needed to be concerned about its relative military might, and specifically about maintaining a technological-warfighting advantage. This group of officials both during their time in the Pentagon and after, along with luminaries from the commercial technology sector, were insistent that surpassing China in AI was essential to preserving US military advantage.[14]

This conviction is reflected in the 2018 U.S. National Defense Strategy (NDS), which categorised the PRC as a peer competitor with the intent and, increasingly, the capability to harm vital US national interests.[15] The remainder of the 2018 NDS followed from this premise. It

directed the Department of Defense to prepare to fight and to win a war against the PRC, and to do so through the acquisition and adoption of the advanced and emerging military technologies of which AI is an essential component.

The 2018 document energised not just the Pentagon, but also much of the Washington D.C. foreign policy establishment, changing the arc of the US-China relationship into an angle. In the years after the 2018 NDS, the United States and China engaged in mutually harmful cultural retrenchment, costly economic statecraft, risky military activity, and heated and non-productive diplomatic exchange. Although these behaviors were accompanied by regular accountings of national investments in AI and by assessments of the relative performance of the states' respective technology sectors, this was indicative of bilateral ambition and anxiety, not of a concerted effort by one state to achieve at the expense of the other.[16] This changed in October 2022, when the United States summarily imposed a set of extensive export controls on China – and only on China – that are unequivocal evidence that US policymakers understand the two states' pursuit of national achievement in AI to be a zero-sum game.[17]

The Biden Administration explained its unilateral export regime, which joins pre-existing controls on explicitly military technologies, as being intended to prevent the PRC from advancing its military capability more quickly than the United States can advance its own.[18] This of course is the same motivation that has driven all arms races; from rocks to knives, from knives to spears, from spears to arrows, to guns, bombs, warships, warplanes, and nuclear weapons.

What is different in the AI race is that the military advances of concern are not only undefined – they are not embodied in a particular type of weapon, or weapon system – but in fact are unknown; there is uncertainty about which technologies, and which applications of those technologies, will prove militarily useful, much less when.

AI-enabled technologies constitute the convergence of a functional problem in need of a solution, with the human ability to imagine, create, and engineer that solution into software and hardware. AI-enabled technologies, in other words, at their core are products of human enterprise and creativity, processes that are not well understood, and

cannot be predicted, much less controlled. This means that for the United States to hinder the PRC's development of military applications of AI specifically, it must hinder Chinese innovation generally.

This will be the effect of restricting PRC access to the technologies included in the 2022 export restrictions, the overwhelming number of which are primarily commercial in application. Although the administration's often repeated metaphor of a high fence built around a small yard may be an apt description of the technical specifications of the restrictions themselves, the regime's implications are more accurately likened to the downstream effects of damming a river.[19]

The Biden control regime, although unilateral, will impede China's high technology sector. This effect would be amplified by the participation of others, but whether unilateral or multilateral, the only thing that can be predicted with confidence is that any slowdown, whatever its extent, will be transient.

China has had a concerted industrial policy since 2015, and although its progress has been uneven, and its successes not as abundant as Xi Jinping's aspirations, "Made in China 2025" observably galvanised research centers, factories, and whole cities. It provided a focus and a direction for the country's particularly bloodsport form of capitalist entrepreneurialism, impulses that were only further stimulated by the Trump Administration's imposition of successive rounds of sanctions and export controls.[20]

Within China, the duel between US restrictions and "Made in China" incentives intensified the association of technological performance with international status, and national pride, and firms responded by making costly near-term investments in service of medium-term independence from US suppliers.[21] There are good reasons, arising from raw economic dynamics and equally raw nationalist sentiment, to think that the Biden restrictions, too, will be met by the Xi regime, and by China's technology sector, with ingenuity, determined action, and a commitment to outcomes.[22]

The most important consequence of the Biden technology regime, however, will not be whether ultimately it is China or the United States that prove better able to innovate – that outcome will be

produced by factors that might include but certainly are not confined to this, or any other, single US policy choice. What is far more significant is that the imposition of the semiconductor control regime marks a conversion of the US-China relationship from moderated competition to explicit antagonism. Beijing will not misunderstand the Biden administration's intent in issuing these controls, and indeed it is no longer possible to maintain the pretense that the United States is not seeking to constrain China's development.

Although at the time of this writing the PRC has yet to issue a formal response either in word or in deed, it retains considerable latitude to retaliate – economically and otherwise.[23] The Biden administration therefore should not expect to be able to isolate the portion of the US-China economic relationship that it thinks will most forestall China's rise from the economic relationship as a whole, or without putting at risk other priorities. An US strategy for deterring China from acting forcibly against Taiwan, for example, no longer can include threatening China with restriction of access to high-end semiconductor technology.

So, too, does the new export control regime force hard choices on the entirety of the global semiconductor supply chain, especially companies headquartered outside the United States – those, for example, in Japan, the Netherlands, and South Korea. If these companies respond by reducing their use of US components in order to retain access to Chinese markets, then US pressure on their governments to impose their own restrictions is likely to grow. Whether incrementally or all of a sudden, this dynamic eventually will force a reckoning even for long-time US allies and partners, who will have to decide whether to take on the US economic war with China as also their own.

The bet the Biden administration seems to be placing is that export controls will give the United States enough time to solidify a durable military-technological advantage over the PLA. It is far from clear that this is a good bet, because the United States face their own challenges in military modernisation; because China may respond in ways the administration does not foresee or for which it has no ready response; because no government controls when and where innovation will happen; and because its repercussions for the entirety of the US-China relationship are unequivocally negative, and likely to be long-lasting.

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