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# Brain Capital's Role in US–China Competition

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*To build resilience and compete effectively, America needs to re-double its efforts to boost its domestic brain capital–the collective social, emotional, and cognitive resources of her people. The China Competition 2.0 strategy needs brain capital.*

For the United States, navigating the new age of the Great Power Competition (GPC) with China is a colossal task because, in addition to military competition, the two countries are in a fierce rivalry spanning a broad range of global markets, technological competition, trade imbalance, and extremely complex global supply chains. Unlike prior global conflicts, this demands a thoughtful and methodical approach to addressing national security and economic goals collectively. The highest priority should be to build technology and economic ecosystems focused on disruptive innovation, dual-use technology development, workforce development, addressing policy matters, and global sales of technologies. The core to building such an ecosystem is brain capital, whereby a premium is placed on brain skills (both cognitive and non-cognitive) and brain health. Investing in the development of brain capital is indispensable for tackling contemporary societal challenges, fostering innovation, and safeguarding economic security.

Brain capital is vital in the context of Cognitive Warfare. The North Atlantic Treaty Organization (NATO) Strategic Warfare Development Command defines this as *'the activities conducted in synchronization with other instruments of power, to affect attitudes and behaviors by influencing, protecting, and/or disrupting individual and group cognitions to gain an advantage'*. Think of scrambling the enemy's sense of reality: rampant disinformation to sow enemy confusion, degrading their mental resilience and provoking them to lose trust in their government and society. Brain capital includes good brain health, digital literacy, awareness of cognitive biases, and resilience, all of which are antidotes to Cognitive Warfare. In a 2023 Annual Report to Congress, references were made to CDO (Cognitive Domain Operations) which stands for China's initiatives in researching and developing what it believes to be the next evolution of psychological warfare.

As competition between the US and China intensifies, US Senator Schumer recently launched the China Competition 2.0 bill. Key goals in the bill are limiting flows of advanced technology and US capital to China, tightening measures to prevent China from buying US farmland, giving US officials more authority to review and restrict foreign computer apps, and deterring China from conflict with Taiwan. China aggressively

deploys Cognitive Warfare tactics. We highlight that brain capital was left out of the China Competition 2.0 bill, despite being a critical new vector to defend American minds and drive competitive excellence for the US. We also note that elements of the brain capital agenda are managed by disparate parts of the US Government, placing a premium on coordination. In figure 1 we provide an overview of key factors to be considered.

**Brain Capital and National Security:**

In the recent Baker Institute article, 'From Neuroweapons to 'Neuroshields': Safeguarding Brain Capital for National Security', we discussed the importance of brain capital for American national security. Key points were the importance of protecting Americans against neuro weapons and disinformation, managing the emergence of dual-use brain-computer interfaces (BCIs), recognizing the national security personnel value of neurodiverse individuals expressing rare and exceptional talents, and investing in innovation to curb the major American brain health disorder burden on our economy. We were inspired to make this case given democracy indicators suggest American democracy is weakening, recent analyses suggest high rates of psychological disturess are a systemic economic risk in the USA, and the US Surgeon General just noted the mental health crisis could undermine our democracy further.

**Figure 1: Key Brain Capital Considerations in the China-USA Great Power Competition**

Cognitive Warface
Dual-use Brain Computer Interfaces
Large Numbers of Engineering Graduates
Fentanyl Production
Social Media Use
Regulation of Social Media
Global Information War
Investments in Neuroscience
Development of Brain Control Weaponry
Quality Science Production
Ethical Constraints on Brain Enhancement Solutions
Brain and Mind Research Diplomacy
Competition between States and Private Corporations

Source: Author

**Dual-Use Brain-Computer Interfaces (BCIs)**

China is making significant strides in the development of BCIs. These devices, which establish a direct communication pathway between the brain and an external device, have potential dual-use applications. While they can be used for medical purposes, such as assisting individuals with disabilities, they also have potential military applications (e.g., operating drones hands-free and warfighter brain performance augmentation). The development of such technology is indicative of China's commitment to gaining an edge in the global brain capital war. We must advance our BCI research activities while keeping ethics in mind. We are encouraged to see engagement in this area by the US Government Accountability Office, the Defense Advanced Research Projects Agency (DARPA), and the Department of Defense. In particular, the DoD Warfighter Brain Health Initiative is a cutting-edge approach.

**Large Numbers of Engineering Graduates**

China's large number of engineering graduates is another factor contributing to its competitive position. These graduates form a significant part of the country's brain capital, providing the necessary human resources for technological advancement and innovation. America may never be able to compete on the grounds of sheer numbers of graduates, so we must optimize the quality of education, work to recruit the best and brightest from around the world, and pay attention to training in uniquely American entrepreneurship. We note The White House has executives from the National Security Council overseeing human capital development and programs such as the White House and US Department of Education Initiative on Advancing Educational Equity, Excellence, and Economic Opportunity through Historically Black Colleges and Universities.

**Social Media Influence**

The influence of Chinese social media platforms, particularly TikTok, on America's most vulnerable, our children and youth, cannot be overlooked. While these platforms provide entertainment and social connection, they also have potential corrosive effects. The algorithms behind TikTok are not known. They have likely fueled the American youth mental health crisis, impacted our children's abilities to concentrate, adversely shaped public opinion, spread misinformation, and even influenced political discourse. This has led some to refer to TikTok as 'digital fentanyl. We applaud the US Surgeon General's Advisory on Social Media and Youth Mental Health.

TikTok's influence extends beyond social discourse to even shaping how books are recommended and sold. This further demonstrates China's ability to shape consumer behavior and knowledge development through digital platforms.

**Regulation of Social Media Use**

While TikTok creates havoc in the US, China's stringent regulation of social media use within its own population is another aspect of its strategy. This regulation allows the Chinese government to control information dissemination and public discourse. They have strict age limits on their platforms for children to protect them. Relatedly, a recent study was conducted on the 'cognitive capital' of Chinese children to support China's next phase of development to ensure the building of a prosperous society. It also provides massive datasets for AI training and understanding human behavior, which can be used on their own population or weaponized against foreign actors like the US. The US Department of State has a Global Engagement Center exploring solutions to this challenge.

**Global Information War**

China has been accused of launching a global information war. Through strategic information manipulation and propaganda dissemination, China seeks to shape global narratives to its advantage. Yuval Noah Harari has argued that advanced AI - which the Chinese are investing heavily to develop - will hack our "operating system," namely our interpersonal relationships and our collective intelligence. Therefore, the global information war may only intensify as AI is leveraged more and more. Harari also recently noted that for every dollar the West spends on AI development, we should spend a dollar on exploring human consciousness and preparing our brains and minds to live alongside advanced AI. We take this to mean investments in brain capital.

**Investment in Neuroscience**

China's investments in neuroscience further underscore its commitment to winning the brain capital war. These investments are aimed at advancing understanding of the brain and developing innovative treatments for brain disorders. The Stanford Emerging Technology Review 2023 recently noted American leadership in neuroscience is essential for establishing and upholding global norms about ethics and human subjects research. As the White House BRAIN Initiative's funding cycle is soon to expire, we need a new brain moonshot. America has the largest venture capital funds for the commercialization of neuroscience. We must ensure we continue to lead this, and should consider public-private approaches to bolstering brain capital technology venture capital funding. We recently developed a brain capital industrial innovation strategy to serve as a roadmap towards the development of a USD $1 trillion-plus new industry, including potential tax incentives and other public-private strategies.

**Development of Brain Control Weaponry**

Reports suggest that China is developing brain control weaponry. The US Government's Departments of Commerce and Treasury have placed China's Academy of Military

Medical Services and affiliated research institutes on an export blacklist for helping the Chinese military to develop such weapons. Such weaponry could potentially be used to disrupt brain functions and control individuals or even entire populations. The Chinese are reportedly using such technologies on the Uyghur populations in Xinjiang.

**Production of Fentanyl**

China's production of fentanyl, a potent synthetic opioid, has had a significant impact on Americans. The widespread availability and use of this drug have led to a public health crisis in the United States. We note the Drug Enforcement Agency is focused on this challenge as well as the Centers for Disease Control and Prevention. Investments in brain capital and dignified, well-paying jobs should complement these approaches to counter the fentanyl crisis and the related epidemic of deaths of despair.

**Quality Science Production**

China is also producing more good quality science. This not only contributes to its global standing but also provides a solid foundation for technological innovation and advancement. Continuing to advance American science quality is the purview of the National Institutes of Health, the National Science Foundation and others. We must also leverage our science diplomacy skills to optimize transnational collaborative efforts. The US Department of State's Science Envoy program is a constructive approach to this priority.

**Ethical Constraints in Brain Capital Enhancement Strategies**

Laurence and Carlisle (2019) provide a comprehensive review of ethical considerations in the context of human performance optimization (HPO), much of which focuses on the brain. Rapid advancements in neuroscience and related disciplines raise the genuine possibility of brain capital enhancements, e.g., the above-mentioned BCIs, that may yield transformative ways of optimizing soldier performance and adaptability, but that may also may pose risks to the soldiers receiving the enhancements and to society at large.

A hypothetical example may illustrate this point. A consequence of the all-volunteer force in the United States military is that, during prolonged war, soldiers will deploy repeatedly. This contrasts with the primarily conscripted Army during the Vietnam War, when soldiers typically deployed to combat in Southeast Asia on time, usually for 12 months, then returned to civilian life. In the recent wars in Iraq and Afghanistan, it was not unusual for soldiers to deploy multiple times. This repeated exposure to combat stress placed a significant burden on soldiers, leading to increases in a host of pathological responses, including suicide, stress-related disorders, depression, substance abuse disorders, and

conduct issues such as family violence. The situation was so bad by 2009 that the Army's Chief of Staff, General George Casey, sought advice from psychologists on how to address the problem. This behavioral health crises resulted in the launch of the Army's Comprehensive Soldier Fitness (CSF) program, a systematic effort to provide soldiers with resilience skills before combat exposure and, in doing so, decrease pathology rates.

Emerging neuroscience may provide novel approaches to addressing combat stress. For example, it may be possible to identify genes involved in combat stress and, through epigenetic or neurochemical interventions, create soldiers who are invulnerable to combat stress. Doing so would increase combat power by reducing the number of soldiers who are non-deployable due to psychiatric conditions while at the same time reducing stress-related disorders and behaviors. However, there may be undesirable second-order effects of such interventions. Soldiers who are invulnerable to combat stress may behave recklessly. Long-term modification of brain chemistry may cause permanent changes in how the brain processes information and responds to threats. If the manipulations were permanent, these changes could prove just as maladaptive in civilian life as they were helpful in combat. After all, would you want to live next door to someone who is not morally and personally outraged by violent actions and death?

Therefore, there must be guardrails against the misuse or development of brain enhancement capabilities to ensure any such strategies are safe and ethical. Laurence and Carlisle provide a model for just such an ethical model. Borrowing from Just War Theory, they propose Just Enhancement Theory, or JET. JET has three basis components for a brain enhancement strategy - in the military context – to be ethical. First, the justification for the intervention or enhancement must be morally acceptable. Second, it must be executed in the right way. And third, the enhancement must respect and preserve human rights and not produce more negative than positive consequences.

The problem is that China may not share the same view toward the ethics and morality of military applications of brain enhancement as briefly summarized here. Their scientists and engineers may not be bound by institutional oversight of human research practices. Thus, the basic science of brain enhancement may advance ahead of their willingness to constrain its use via ethical standards. If so, US forces may someday find themselves in direct combat with soldiers who, due to unrestrained brain enhancements, may outperform them on a massive scale. In short, China's leaders may not care if an intervention is moral or ethical, causes harm to individuals or to society, or has lasting ill effects among its soldiers or veterans. US strategists must look at how to prepare for such an eventuality.

**Competition between States and Private Corporations**

We are in a fundamentally different governance environment than when we last competed technologically through brain capital against a great power peer. Up until the development of solid-state electronics in the late 1960s, most of the brain capital and investments were in the defense industry or in the government research and development sector. Not the case anymore; as we know, the Silicon Valley tech sector employs the vast majority (around 95% in some fields) of artificial intelligence, math, computer science, and electrical engineering PhDs that our universities produce annually. And despite these being US-headquartered and registered corporations, their need to access the Chinese market constrains the amount of alignment their corporate interest will have with the national interest. For example, if Apple's market valuation were translated to GDP, it would be the world's sixth-largest economy. This represents a diffusion of state-like economic power to an international actor that is decidedly not a sovereign state. In a sense, then, great power competition is not simply a competition between states; it can also be a competition between states and their corporations. What makes the US economy powerful—the existence of such corporations and friendly market conditions that allow them to increase in multiple value propositions—is probably what also makes it uniquely vulnerable to this emergent type of brain capital competition.

**What Can America Do to Out-Compete Chinese Brain Capital?**

While it is difficult to say whether China has higher brain capital definitively, it is clear that it is making significant strides in this direction. For the first time, the brain capital framework allows us to take an integrated approach to assessing if China is or is not winning. We must ensure the diverse pieces of brain capital do not 'slip between the cracks' for the US Federal Government.

Our recently released Global Brain Capital Dashboard offers us an entirely new way of tracking progress around brain capital policy innovation, impact, and outcomes. This work now needs to be developed at the nation-state level and ideally looking state-by-state and province-by-province.

The brain capital framework also allows for developing new strategies to boost American brain capital and bolster American brain and mind resilience. We must carefully explore policy approaches to boost brain capital in all policy areas. We have begun to do this in industrial innovation policy, health policy, disinformation policy, AI policy, sustainability policy, and many others and outlined these recently here.

A coordinated governance approach to managing the brain capital war with China is essential e.g., a White House Brain Capital Task Force. There must be an entity established within the Federal Government to monitor, track, and harmonize these oft-

disparate issues. We suggest this should be a public-private task force and it should engage across the National Security Council, the Department of Defense, the Department of Health and Human Services and the Office of Science and Technology Policy. This must also include collaboration with entities such as NATO, the European Union, and the Organisation for Economic Co-Operation and Development (OECD).

Both sides of the competition must manage the challenge associated with most of their brain capital being in private industry; there are inherent limitations in how much and how quickly this capital could be mobilized by a government towards some great power competition interest. As a socialist market economy, China is probably in a better position to achieve such mobilization than the United States. Accordingly, we believe that the proposed White House Brain Capital Task Force should pay equal attention to overcoming internal mobilization barriers with the "coordinate across public and private sectors" piece.

Of course, coordination and dialogue with China are essential in many of the above-mentioned areas around science. Regulation and best practices. The abovementioned Brain Capital Task Force would need to keep a list of what we will compete on, what we will collaborate on, and what we will coordinate on. There are many rich areas for collaboration such as mental health and neurological research.

China is positioning itself as a formidable competitor in the race for global brain capital dominance. America must rally and coordinate across public and private sectors to match and outcompete in this race.

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