WINNING WITHOUT FIGHTING, REVISITED. THE PLA PERSPECTIVE ON COGNITIVE AND BIOLOGICAL WARFARE.

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Cognitive warfare has rapidly become central in the debates about the character of modern and future conflict. A precise and universally accepted definition of the concept is still lacking, as experts across both military and academic circles tend to converge on a number of core aspects, most notably the centrality of the mind and cognitive processes, while diverging on the meanings and possibilities of these dimensions at both the tactical-operational and strategic levels. The People's Liberation Army (PLA) stands out here for a pronounced sensitivity to the cognitive dimension of war. Its approach brings to the fore the biological substrate of the mind, and with it the human brain itself, thus going beyond merely restating psychological warfare in an updated form. This focus, it is worth noting, is not absent from Western thinking: in NATO's 2025 Chief Scientist Research Report on cognitive warfare, for instance, we find a notable role granted to advances in cognitive neuroscience. Yet there it sits within broader conceptualizations that remain centered on the information environment. In PLA discourse, by contrast, the biological substrate is treated as a more central object of military ambition.

In 2017, Major General He Fuchu forecast that "the sphere of operations will be expanded from the physical domain and the information domain to the domain of consciousness; the human brain will become a new combat space". Following this view, cognition takes its rightful place alongside the land, sea, air, space, electromagnetic, and cyber domains as one more arena of warfare. The mind acquires this centrality once it is seen as the point where information ultimately takes effect: the point at which sensing, data, and communication finally resolve into perception, understanding, judgment, and ultimately decision. To act on perceptions, cognition, and emotions, sowing confusion among enemy commanders and decision-makers while eroding the morale and the will of the adversary, thus becomes a direct route to military advantage in a renewed technological race among great powers. Framed this way, the ambition is at once modern and very old. The aspiration to prevail without fighting, to subdue the enemy without a direct physical confrontation, to capture "hearts and minds" before bodies, runs deep in Chinese strategic culture and is conventionally traced back to Sun Tzu. These are, in essence, informational and psychological operations, and part of what makes the cognitive domain attractive is that it reframes a long-standing strategic ambition as a scientific and technological frontier. What is genuinely new, as discussed above, is not this informational lineage – which remains central, and is being reshaped in important ways by the rise of AI – but the way it now reaches into the biology of cognition itself, drawing on advances in neuroscience.

Chinese strategists expect future conflict to be "intelligentized", meaning that it will be shaped less by overwhelming firepower than by securing an edge in data flows, storage, in the algorithms that organize and process those data, and in the sheer speed of reaching an accurate decision. Crucially, in Chinese discourse AI is not set on a competition against human intelligence; on the contrary, it is the pairing of the two that is seen as the way to secure that edge. This translates into a focus on human-machine coordination, on decision-support systems, and on what some authors call "brain-machine fusion" as a future model for

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A person taking part in an EEG neuroscience experiment. *Source: Wikimedia Commons*

command and control, one in which the commander's judgment is combined with the machine's speed rather than banished "from the loop" by its autonomy. Brain-computer interfaces are central to this ambition, since they promise a direct link between the human brain and the machine. Research on decoding and using neural signals is under way at military institutions such as the National University of Defense Technology and the PLA Information Engineering University, where it has reportedly been applied to steer drones, vehicles, and computers through neural signals alone.

A parallel line of inquiry shifts the focus from enhancing brain–machine capabilities to understanding the brain itself. At the Academy of Military Medical Sciences, researchers have sought to acquire neural information through electroencephalography (EEG), magnetic resonance imaging (MRI), and functional magnetic resonance imaging (fMRI), while also conducting experiments involving implants in the cranial nerves of primates, which are considered a suitable model for human cognition. Reading and measuring the brain in this way is the necessary groundwork for a more analytical ambition: if cognition can be recorded, it can in principle be modelled. In fact, the notion of "cognitive modelling" has recently emerged in PLA's writing precisely at this intersection between cognitive science and advanced computing, bringing together cognitive psychology, cognitive neuroscience, computer modelling, artificial intelligence, and artificial neural networks. Its purpose is precisely to move beyond an abstract account of cognition by developing operational models of how perception, attention, memory, learning, problem-solving, and decision-making unfold. As discussed in a RAND study on China's approach to next-generation psychological warfare, this line of research is explicitly tied to military aims: cognitive modelling is presented as a way to understand how a specific target processes psychological content, how attitudes and behavior may be shaped, and how the effects of such operations might be simulated and evaluated. The ambition, therefore, is to reduce uncertainty about how individuals, military forces, decision-makers, and broader populations are likely to interpret information and respond to it. In this sense, cognitive modelling points toward a more systematic and potentially more predictive form of psychological warfare. Yet, as the RAND analysis also stresses, China's actual capabilities in this field remain uncertain and may still be limited, falling short of providing complete insight into cognition.

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So far, the cognitive domain has appeared as a matter of information and inference. In its most recent formulation within PLA discourse and research, however, it increasingly extends to the physical substrate of cognition itself: the brain as an organ that can be read, enhanced, degraded, or directly acted upon. This biological emphasis is not entirely new in PLA thinking; what appears to be changing is its status within it. Ideas once regarded as speculative, marginal, and contested even within PLA circles – at times dismissed as the work of a small group of enthusiasts repurposing concepts already abandoned in earlier U.S. debates – now seem to occupy a more central position. This evolution can be traced both in the institutions now involved in this field of research and in the scientific developments that make such ambitions appear more technically plausible than in the past. Relevant studies are now emerging from a wider network of military universities, research institutes, and state-supported laboratories, with public funding playing an important role in signaling the growing institutional recognition of these lines of inquiry. Quantitatively, the shift is reflected in the fact that research on cognitive warfare and brain-oriented technologies appears less isolated than in the past, and more organically embedded within the broader military-scientific enterprise. Qualitatively, too, as noted, the picture has changed: advances in neuroscience, neurotechnology, neuromodulation, drugs, and the so-called "neuroweapons" have given renewed plausibility to ambitions that not long ago appeared largely speculative.

This move toward the biological substrate of cognition should also be placed within the broader reflections of PLA researchers on the military significance of biology itself. In Chinese military writings, the brain does not appear in isolation, as a merely neuro-cognitive object, but as part of a wider attempt to conceptualize biology as a new field of military competition. PLA-affiliated authors have increasingly discussed the possibility that advances in biotechnology, synthetic biology, genomics, bioinformatics, and human enhancement may alter the character of future conflict. Concepts such as "biology-enabled warfare" and "biological dominance" point exactly in this direction as they suggest that biological processes and matter may become objects of strategic competition in their own right. This broader turn helps clarify why the brain occupies such a prominent place in PLA discussions of cognitive warfare. If future war is expected to be increasingly "intelligentized", then the biological conditions of intelligence, cognition, endurance, perception, and decision-making acquire military relevance. In this sense, cognitive warfare and biological warfare overlap around a shared ambition: to understand, manipulate, or disrupt the human abilities on which military effectiveness ultimately depends. The same logic also appears in PLA interest in human performance enhancement. Research and strategic writings on gene editing, pharmacological enhancement, and brain-machine interfaces, in fact, point to a dual interest: weakening the adversary and enhancing the capabilities of one's own forces.

The recurrence of such research interests across military writings, research programmes, and funding streams suggests that these ideas are increasingly being incorporated into the way the PLA imagines the future of warfare, even though this should not be taken to mean that the most ambitious claims made in these debates are technically achievable or that speculative concepts already amount to operational capabilities. Nonetheless, the result is a conceptual shift with important implications. In this formulation, cognitive warfare increasingly appears as part of a broader military-scientific effort to understand and act upon cognition as both an informational and biological process, one shaped by narratives, signals, and algorithms, and also, and more significantly, by neural activity, bodily states, or genetic factors. The old ambition of "winning without fighting" is therefore reframed in a way that goes beyond the attempt to defeat the enemy's will through deception, persuasion, or psychological pressure, and moves toward the pursuit of advantage over the biological and cognitive conditions that make the enemy's will, judgment, and action possible in the first place.

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