**The Evolutionary Logic of Adaptive Warfare**

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**●In the era of intelligence, the human-machine collaboration model is evolving from “people inside the loop” to “people on the loop” and “people outside the loop”.**

　introduction

　　There is an animal in nature called "chameleon", which can change the color of its skin to camouflage according to changes in the surrounding vegetation, light and other environments, to avoid attacks from natural enemies and to hunt prey. This is the "adaptation" of organisms. With the continuous development of artificial intelligence technology, the future intelligent combat system will gradually have this ability, that is, according to the ever-changing battlefield situation, it will autonomously adjust the combat system, autonomously adjust combat forces, autonomously regulate combat actions, autonomously adjust combat effectiveness, and autonomously allocate combat resources, thereby promoting the transformation of the combat system and combat chain from "people in the loop" control to "people on the loop" and "people outside the loop" intelligent and agile adaptation.

**The Inevitable Trend of Adaptive Warfare**

　　Adaptive combat is an important manifestation of the development of intelligent combat. Intelligent warfare focuses on the struggle for intellectual power, while adaptive combat, based on high intelligence, focuses on improving the speed and quality of confrontation, which is more in line with the combat needs of modern warfare.

　　Adaptive warfare conforms to the changes in the form of war. With the support of "information" and "intelligence", modern warfare presents new characteristics of mutation of dominant technology, displacement of main battle space, transformation of main force, reshaping of main structure, transformation of main control mode, and alternation of main victory mechanism. The dimension of war has expanded from traditional fields to network domain, biological domain, social domain, etc.; the form of war is based on artificial intelligence, big data, cloud computing and other technologies and presents a trend of rapidity and efficiency. In recent wars, unmanned and intelligent equipment have been widely used, and the "OODA" loop in combat has gradually extended from plane to three-dimensional, from overall to front-end, and from centralized to decentralized. Therefore, adaptive warfare with high cost-effectiveness, high compatibility and high wide-area applicability will surely become an important trend in intelligent warfare.

　　Adaptive warfare conforms to the changes of the scientific and technological revolution. War and technology complement each other and are inseparable. War drives the development of science and technology, while scientific and technological progress greatly promotes the development of weapons and equipment, and the change of war concepts and forms. The development of 5G network communication technology, quantum communication technology, and satellite communication technology has expanded the depth, dimension, and reliability of intelligent combat communication and liaison; cloud computing, blockchain, and big data technology have strengthened the brainpower and computing power of intelligent combat command and planning; high-intelligence simulation algorithms, digital twin technology, and artificial intelligence technology have improved the scientificity and efficiency of intelligent combat decision-making assistance; unmanned reconnaissance platforms and unmanned strike platforms have broadened the visual range and firepower arm of intelligent combat operations. Adaptive warfare will efficiently integrate information intelligence, intelligent technology, weapons and equipment and other resources, dynamically calculate the optimal solution for real-time changing battlefield situations, and independently implement operations.

　　Adaptive combat conforms to the changes in the transformation of the army. Knowing yourself and the enemy, you will never be defeated in a hundred battles. The world's military powers are constantly building "high-end warfare" capabilities and actively promoting the transformation and development of the army. It is reported that after the US military proposed the concept of "Mosaic Warfare", it set up a special "Adaptive Capability Office" to tackle key technologies such as sensing and tracking, lethality, survivability, communications, advanced combat management, complex full-domain experiments, and digital twins. At present, the US military has initially improved the adaptive combat management technology to support "Mosaic Warfare" and realized adaptive combat planning based on the commander's intention to help commanders "manage" operations, intelligently formulate combat plans, form task lists, assign combat tasks, generate combat forces, deploy combat resources, and optimize combinations. With the gradual improvement of experimental demonstration technologies such as intelligent experimental analysis technology and real-time dynamic game analysis technology, the adaptive combat concept will empower more platforms, systems, and systems of foreign armies.

**The essence of adaptive warfare**

　　The essence of adaptive warfare is to implement intelligent warfare of autonomous detection, control, attack, assessment and protection based on wide-area existing platforms, full-area communication guarantee and various intelligent algorithms. The focus is on the terminal platform extension of artificial intelligence technology, and the key lies in domain integration, deployment and intelligent control.

　　Multi-domain self-coupling formation. Modern warfare is a comprehensive contest of strength, resources, psychology, and will. Adaptive warfare will integrate multiple domains such as the physical domain, information domain, and social domain, re-plan the combat system structure, and completely re-build combat action links, changing the previous fixed and planned formations. By using intelligent technology, it can dynamically analyze the enemy situation, our situation, and battlefield situation in real time, autonomously solve force matching, comprehensively evaluate action plans, and agilely dispatch dynamic formations to achieve multi-domain self-coupling formations.

　　Multi-base self-organizing network link building. After completing the coupled formation of combat forces, the adaptive combat system needs to combine the multi-dimensional space participating forces such as land, sea, air, space, electricity, and network to build an efficient combat network link to support it. According to the development of the battlefield situation and the requirements of different tasks, it automatically analyzes and recognizes the battlefield and automatically adjusts the network link, so as to better carry out human-machine and machine-machine information interaction, and rely on a multi-base, integrated network system to achieve large-bandwidth, high-speed information transmission.

　　Multimodal self-sensing search. In the eyes of foreign militaries, the requirement of the adaptive combat center is "discover and destroy", that is, to accurately complete the "one process" of discovering targets, verifying targets, locating targets, and indicating targets. This requires relying on intelligent recognition technologies such as images, videos, audio, and text to strengthen feature matching activation, share data in real time and operate in multiple domains based on the integration of multi-dimensional network links, and complete autonomous sensing and recognition, autonomous analysis and judgment, and autonomous positioning and indication through various sensors distributed over a wide area.

　　Diversified self-coordinated strikes. Adaptive warfare emphasizes relying on advanced technologies such as big data and cloud computing, as well as unmanned and intelligent combat platforms. On the basis of completing automatic identification, comparison and verification, and autonomous tracking of combat targets, it accurately analyzes the intensity of tasks and execution requirements according to the location of each platform and the degree of human participation, and instantly dispatches single-type strikes; accurately determines the enemy's force composition and quantity scale, dynamically organizes and cooperates to fight, and meticulously calculates the threat level and damage indicators, and conditionally triggers layered defense blocking.

　　Multi-means self-synchronous evaluation. Relying on a highly self-adaptive integrated sky-ground network, and supported by computing power, algorithms and data, the adaptive combat system will use a "decentralized" combat network to reshape the existing "OODA" combat loop, that is, change the loop into a point, and disperse the evaluation function to a wide area distribution and various miniaturized, stealth, and unmanned combat platforms, so as to achieve real-time general evaluation and agile and accurate evaluation within the dynamic formation, and realize the parallel operation of various elements in the adaptive combat system.

　　Multi-mode self-response support. The adaptive combat support system is based on the integrated military-civilian "Internet of Things" support, with combat needs as the primary priority and automatic response as the fundamental requirement. It uses big data technology to sense and analyze the damage of each node, reasonably dispatch the multi-dimensional combat forces and combat resources in the entire domain, rescue and repair personnel and equipment, and replenish ammunition and supplies in time to complete the repair and strengthening of the combat system, so as to ensure the continuity of combat power and minimize combat losses, so as to achieve continuous combat and high-efficiency combat.

**Practical Basis of Adaptive Warfare**

　　In order to firmly grasp the initiative in informationized and intelligent warfare and win informationized and intelligent joint operations, we must accurately grasp the practical basis of adaptive warfare.

　　The combat form is the unity of the contradictions between the basic elements of weapons and equipment, combat methods and organizational forms. If an army lags behind the times and lags behind the development of combat forms and combat methods, it may lose the strategic and war initiative. Adaptive combat is an important style of intelligent combat, which is a high-tech and high-cost confrontation form based on intelligence. Real-time perception of battlefield situation provides "wisdom eyes" for adaptive combat, real-time strikes in cross-domain operations provide "arms" for adaptive combat, highly intelligent decision-making systems provide "brains" for adaptive combat, and network information systems provide "meridians" for adaptive combat. "Adaptive" has become a typical feature of this combat form.

　　Scientific military theory is combat effectiveness. Whether combat theory is advanced or not is an important indicator of the combat effectiveness of an army. In order to seize the leading position in future wars, it is necessary to actively innovate military theory and maintain the advancement of combat theory. If the research on adaptive combat theory cannot keep up with the development of war needs, it will directly affect the preparation for intelligent war. Adaptive combat theory cannot be innovated, and innovation cannot be slow. We must unlock the theoretical code of adaptive combat and unveil the war veil of adaptive combat, project the winning mechanism, combat application, force deployment, weapon application and other contents of intelligent combat into adaptive combat research, and innovate and develop the concept system of adaptive combat.

　　Weapons and equipment are important weights in military games, basic tools for engaging in war, important components of combat strength, and important factors in the outcome of war. Advanced and adaptive intelligent weapons and equipment have become an important material basis and basic prerequisite for implementing adaptive warfare. With the in-depth development of military intelligence, weapons and equipment are gradually getting rid of the limitations of human physiological limits on equipment performance. The number of intelligent combat equipment has exploded, the combat system has become increasingly complete, the strike speed has increased, the strike accuracy has increased, the strike power has increased, the strike means have become more diverse, and the combat effectiveness will be more prominent.

　　Combat support is the cornerstone of maintaining combat operations. In a sense, fighting a war is about fighting support. In intelligent warfare, the opposing sides will invest a large number of advanced weapons and equipment to organize high-mix operations and high-consumption confrontations. In order to maintain a highly adaptive state, accurate, scientific, and rapid support is essential. In particular, adaptive combat involves many combat fields and many types of support. It is necessary to change the traditional support concept, innovate and develop combat support models, build a dynamic resource cloud pool, and use technologies such as the Internet of Things and big data to change from centralized to decentralized, from temporary to pre-set, and from static to dynamic, so as to achieve unified and coordinated control of various types of combat support forces and support resources dispersed over a wide area, and complete dynamic aggregation support.