Learning without Fighting
The PLA Prepares for Future Warfare

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Initial Assessments

- The Chinese People's Liberation Army (PLA) confronts the challenge of military innovation in peacetime and without contemporary operational experience.

- Seeking to learn without fighting, the PLA has explored new techniques for "actual combat" training, launched new initiatives in military science research, and expanded and reinvigorated war-gaming and simulations.

- The application of emerging technologies, including big data analytics, virtual reality, and advanced simulations, could contribute to the PLA's attempts to compensate for current shortcomings, but may also create new challenges.

China's National Defense in the New Era

- "The history of the people's armed forces is a history of reform and innovation."

- "The form of warfare is accelerating in its evolution towards informatized warfare, and intelligentized warfare is on the horizon."

- "China's military security is confronted by risks from technology surprise and growing technological generation gap."
  - applications of big data, Internet of Things, artificial intelligence, and quantum information

The Imperative of Military Innovation

"In a situation of increasingly intense global military competition, only the innovators win."

"Accelerate the development of military *intelligentization*" (智能化), and improve joint operations capabilities and all-domain combat capabilities based on network information systems."

—19th Party Congress, October 2017

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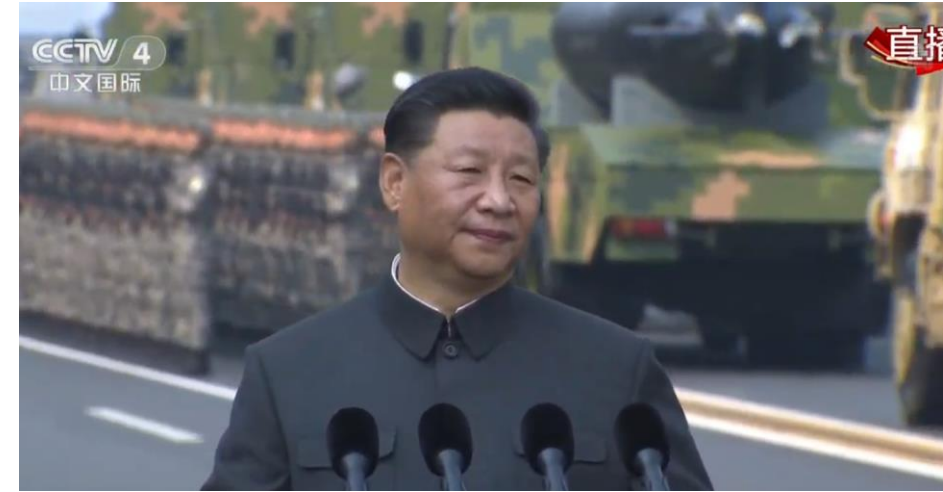
The AI Revolution in Military Affairs

"AI will accelerate the process of military transformation, ultimately leading to a profound Revolution in Military Affairs … The combination of artificial intelligence and human intelligence can achieve the optimum, and human-machine hybrid intelligence will be the highest form of future intelligence."

— Lt. Gen. Liu Guozhi, director of the Central Military Commission Science and Technology Commission.

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"Actual Combat" Training

- new series of joint exercise through theater commands ("the East," "the South," "the West," "the North," and "the Central")

- live force-on-force exercises gradually becoming less scripted, more demanding
  - e.g., PLAA's Firepower, PLAN's Mobility, PLAAF's Red Sword, PLARF's Heavenly Sword, PLASSF's increasing participation in joint training
  - recent announcement of new 'brand' for PLAAF training, *Qingdian* (擎电) exercises, concentrating on electronic warfare capabilities

New Techniques in Training

- leveraging blue forces to simulate advanced adversary for confrontation

- initial employment of virtual reality for training and psychological conditioning
  - e.g., introduction of new VR systems, including for 'combat skills simulation training'

- exploration of options to leverage "LVC" (live, virtual, and constructive) training to capture full complexity of modern warfare
 - close study and adaptation of lessons learned from U.S. training techniques

Military Innovation in Theory

- 'military science' concentrating on creating new theories and concepts for future operations

- new initiatives, conferences, and competitions to promote military innovation
  - exploring AI in undersea, aerospace, etc. applications, developing robotic/unmanned systems

- notion of "theory-technology integration" (理技融合) to leverage strategic and technical expertise
  - e.g., deeper partnership and engagement between Academy of Military Science and Chinese Academy of Science academicians

New Concepts for a New Era?

- new 'dominances' for future warfare, 'command of biology' (制生权), mental dominance (制脑权), and 'intelligence dominance' (制智权)

- opportunities for asymmetric approaches to future autonomous operations, along with potential to counter or subvert adversary's intelligentized capabilities

- continued difficulties in translating theory into more concrete operational regulations (作战条令) to employ in practice
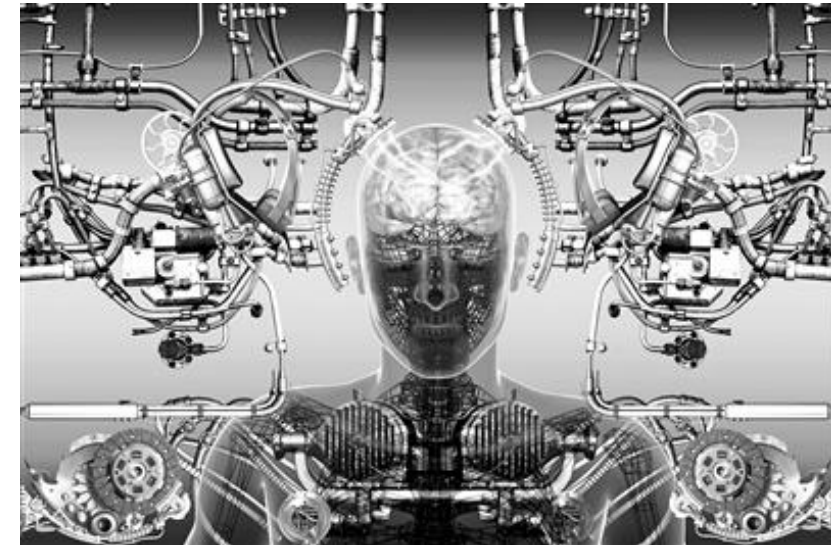
Challenges of Military Big Data

- "Without data, (you) can't (wage) warfare..." (无数据不战争)

- efforts to promote military-civil fusion for national defense big data, including to support national defense mobilization

- data as the 'lifeblood' of informatized and intelligentized operations
  - e.g., symposiums on military big data convened by Academy of Military Science, involving military and industry stakeholders

- recognition of challenges of collecting, managing, integrating data for defense applications
  - issues of talent, complexity, requirements for security, challenges of processing

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Past, Present, and Future of PLA War-Gaming

- early antecedents from tradition of Go to initial efforts under Qian Xuesen to introduce military simulations, techniques from operations research,

- despite earlier difficulties in promoting, introduction of computerized war-gaming through National Defense University, particularly efforts of Maj. Gen. Hu Xiaofeng starting around 2007
  - launch of initial system by 2014 by NDU

- commercialization and popularization of war-gaming through companies contributing to military-civil fusion

- from tactical to more complex campaign scenarios that are variously historical and more contemporary
  - e.g., from war-gaming the Gulf War to war-gaming operations in space or cyberspace

War-Gaming in National Defense Education

- PRC initiatives in national defense education concentrating on the popularization of war-gaming with students
  - since 2014, a series of war-gaming competitions convened in Beijing
- Since 2017, national war-gaming tournaments organized with guidance from National Defense Education Office involvinng several thousand participants at universities nationwide
  1. 2017: 'Iron Armored Assault Group' (铁甲突击群)
  2. 2018: 'Assault—Fleet Commander' (突击一舰队
  3. 指挥官)
  4. 2019: 'Intelligent Weaponry — Future Commander' (智戎一未来指挥官)

"Iron Armored Assault Group"

- platform for tactical-level offensive and defensive confrontations across multiple terrains, including enabling human-machine confrontation
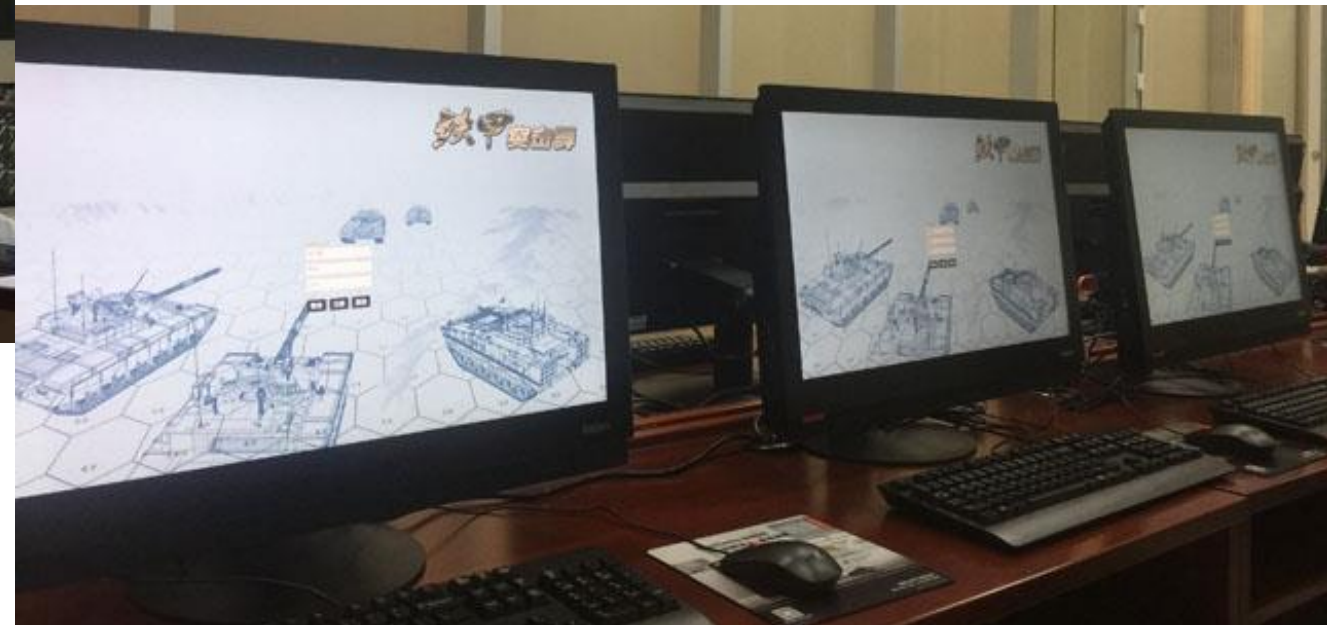
Assault—Fleet Commander

- modern naval battle including carriers, aerial combat, anti-submarine operations

- simulates 1942-43 U.S.-Japan naval battles taking place in 'Ironbottom Sound' between Guadalcanal and Savo Island

'Future Commander'

-inspired by CMANO, basically civilian version of PLA's "Mozi" joint operations war-gaming system

- future conflict involving joint operations across air, sea, space, electromagnetic domains

Artificial Intelligence and Human-Machine Confrontation

- increased employment of artificial intelligence in war-gaming, inspired in part by AlphaGo

- CASIA's 'Prophet 1.0' system initially piloted in 2017 at war-gaming tournament
  - thousands of rounds of human-machine and machine-machine confrontations

- potential relevance to decision support, planning, etc., to overcome current obstacles to 'intelligentization' of command and control
  - generation of data, capabilities with broader relevance, applicability

Conclusions and Implications

- China is pursuing an "innovation-driven" strategy for economic development and military modernization, seeking to strengthen its military through science and technology (科技强军).
  - Although military-technological advantage has been a key pillar of U.S. military power and national competitiveness, China is catching up.
- The PLA seeks to change future paradigms of military power through military innovation.
  - The high-level directive to promote innovation and advance intelligentization could overcome prior inertia and obstacles.
  - The PLA's improvements in training and initiatives in war-gaming could contribute to the its efforts to overcome a lack of combat experience.

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Thank you.

Questions?

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