



American-Chinese War for Strategic Dominance in the Field of Artificial Intelligence and the New AI Geopolitics*

Piotr Grochmalski, PhD, Asc. Prof. at the War Studies University

ORCID: 0000-0002-5671-3339

e-mail: p.grochmalski@akademia.mil.pl


War Studies University (ASzWoj), Warsaw, Poland

ABSTRACT:

The author shows that the current strategic rivalry between the People's Republic of China (PRC) and the USA, aimed at achieving or maintaining global leadership, is approaching a bifurcation point. The process is going to become especially dynamic in the area of Artificial Intelligence (AI). Both states consider it crucial in the race to obtain strategic dominance over the adversary, which, in turn, accelerates the development of AI technology and increases its influence on economic, political and social processes. The coronavirus pandemic acted as an important catalyst in the process and made it even more dynamic. The USA and the PRC have now dominated the rivalry for the use of artificial intelligence in technology. Their confrontation in this area is now entering the phase of a critical point of imbalance of the international system and puts growing pressure on the race to develop military AI technologies. Another consequence is the emergence of new geopolitics based on the effective use of dataficated space and technological infrastructure in the rivalry. This might lead to reaching a point of bifurcation and, consequently, cause a global risk brought about by introducing into security structures AI technology which has not been tested in critical conditions. This can cause a sudden breakdown in the stability of systems and a transition into a self-organized criticality of the world.

KEYWORDS:

Artificial Intelligence, the United States, the People's Republic of China, AI geopolitics, strategic domination, point of bifurcation

OPEN ACCESS  © 2020 P. GROCHMALSKI PUBLISHED BY MILITARY PUBLISHING INSTITUTE, POLAND.
THIS WORK IS LICENSED UNDER THE CREATIVE COMMONS ATTRIBUTION-NONCOMMERCIAL-NO DERIVATIVES 4.0 LICENSE

*** Publication financed within the project implemented in the Research Grant Program of the Polish Ministry of National Defense.**

Overview of Literature

A new research perspective on the correlations between geopolitics and information was established in a breakthrough article by R. Keohane and Joseph S. Nye Jr., who presented the impact of information on the independence of a state and sketched the outline of information geopolitics.¹ The first person to comprehensively present the shaping of a new civilization based on information (*informationalism*) as the material foundation of the international community, was Manuel Castells.² In his groundbreaking work on the rise of the network society, as well as the social, political and economic consequences of this phenomenon, he signaled the appearance of a new geopolitical perspective induced by the widely understood technology and information revolution.³ However, it was really Abishur Prakash's publications, in particular his work entitled *Geopolitics of Artificial Intelligence*⁴ of 2018, that offered a breakthrough approach to the technological revolution and its influence on social processes, and presented the sharp rise in the use of AI in the context of far-reaching changes it causes in the geopolitical environment. The author puts forward a strong thesis that AI will lead to the creation of essentially different, new geopolitics, specific to those technologies. His publication of 2016, entitled *Next Geopolitics; The Future of World Affairs (Technology)*,⁵ already outlined this new area of research analysis (the author also mentions Poland in the context of the emerging geopolitical reality).⁶ The works of Jayshree Pandya⁷ also offer important observations on ongoing geopolitical transformations induced by the development of AI. The interdependence of the current geopolitics of information and AI geopolitics is well presented in a publication by Eric Rosenbach and Katherine Mansted.⁸

P.J. Blount analyzes the interaction between cyberspace and geography and international relations.⁹ The Chinese perspective in the global rivalry for AI resources, and the

1 R. Keohane, J.S. Nye Jr., *Power and Interdependence in the Information Age*, "Foreign Affairs", Sep/Oct 1998, pp. 81–94.

2 "The information technology revolution induced the emergence of informationalism, as the material foundation of a new society", M. Castells, *End of Millenium*, Singapore 2010, p. 372.

3 M. Castells, *End of Millenium*; M. Castells, *The Power of Identity*, Singapore 2010; M. Castells, *The Rise of The Network Society*, Singapore 2011.

4 A. Prakash, *Geopolitics of Artificial Intelligence*, Amazon Digital Services LLC – Kdp Print Us, 2017.

5 A. Prakash, *Next Geopolitics; The Future of World Affairs (Technology)*, Volume One, 2016.

6 A. Prakash, *Growing Poland's Geopolitical Power Through Technology*, Wszystko Co Najważniejsze, on: <https://wszystkoconajwazniejsze.pl/abishur-prakash-growing-polands-geopolitical-power-through-technology> (accessed on: 12 Oct 2019).

7 J. Pandya, *The Geopolitics of Artificial Intelligence*, "Forbes", January 28, 2019, on: <https://www.forbes.com/sites/cognitiveworld/2019/01/28/the-geopolitics-of-artificial-intelligence/#3959876d79e1> (accessed on 16 Mar 2020).

8 E. Rosenbach, L. Mansted, *The Geopolitics of Information*, Belfer Center for Science and International Affairs, Harvard Kennedy School, 28 May 2019, p. 5.

9 P.J. Blount, *Reprogramming the World. Cyberspace and the Geography of Global Order*, Bristol 2019.

geopolitical consequences of that rivalry, are presented by Kai-Fu Lee in his widely discussed work.¹⁰ A different standpoint is expressed by Nicolas Miaillhe in his article “Géopolitique de l’Intelligence artificielle: le retour des empires?”¹¹ The article also refers to a publication by Gen. Robert Spalding,¹² as well as his analysis of the USA’s and China’s strategies in their ongoing rivalry – also in the military context.¹³ Important thoughts are brought to the discussion in the articles written by Paul Scharre, an analyst who has for many years studied the problem of autonomous systems and AI,¹⁴ as well as in the report entitled “The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation,” prepared by leading centers specializing in AI (also with his participation).¹⁵ The impact scale of the AI revolution is confirmed by the fact that most developed countries have their own national AI strategies in place. Some of them are referred to in this work (i.a. the one developed by NITI Aayog for India¹⁶). An important point of reference are also the studies conducted by a team of analysts of the Institute for Strategic Studies at the War Studies University, carried out within the framework of the project “Polska Racja stanu w perspektywie 2035 roku” [Polish Raison d’Etat in the Perspective of 2035], in particular the research that connects the discussion on AI technology with geopolitics.¹⁷ On top of that, the work mentions other studies conducted by various research and analytical centers; among them, a publication of Oxford-based researchers on the Chinese AI development program.¹⁸ Tim Dutton’s synthetic overview of the most important national strategies in the modern world,¹⁹ as well as reports of the Center of Studies on Civilization Challenges of the Security Research Center

-
- 10 K-F. Lee, *AI Superpowers. China, Silicon Valley, And The New World Order*, Boston 2018.
- 11 N. Miaillhe, *Géopolitique de l’Intelligence artificielle: le retour des empires?*, in: “Politique étrangère” 2018/3 (Automne), pp. 105–117, https://www.cairn.info/article.php?ID_ARTICLE=PE_183_0105 (accessed on: 19 Oct 2019).
- 12 R. Spalding, *Niewidzialna wojna. Jak Chiny w biały dzień przejęły wolny Zachód* [original title – *Stealth War: How China Took Over While America’s Elite Slept*], Warszawa 2019.
- 13 R. Spalding, *Clash of Strategic Cultures*, March 5, <https://nsiteam.com/social/wp-content/uploads/2019/03/Spalding-IP-Clash-Final-5Mar19R.pdf>, (accessed on: 12 Sep 2019).
- 14 P. Scharre, *Killer Apps. The real Dangers of an AI Arms Race*, “Foreign Affairs”, May/June 2019, Volume 93, Number 3, pp. 135–144; P. Scharre, *Army of None: Autonomous Weapons and the Future of War*, New York, 2018.
- 15 M. Brundage, Sh. Avin, J. Clark, H. Toner, P. Eckersley, B. Garfinkel, A. Dafoe, P. Scharre, Th. Zeitzoff, B. Filar, H. Anderson, H. Roff, G. C. Allen, J. Steinhardt, C. Flynn, S. Ó hÉigeartaigh, S. Beard, H. Belfield, S. Farquhar, C. Lyle, R. Crotofof, O. Evans, M. Page, J. Bryson, R. Yampolskiy, D. Amodei, *The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation*, February 2018, on: https://img1.wsimg.com/blobby/go/3d82daa4-97fe-4096-9c6b-376b92c619de/downloads/1c6q2kc4v_50335.pdf (accessed on: 16 Apr 2020).
- 16 NITI Aayog, *National Strategy For Artificial Intelligence*, on: <https://niti.gov.in/sites/default/files/2019-01/NationalStrategy-for-AI-Discussion-Paper.pdf> (accessed on: 25 Oct 2019).
- 17 The MoND’s Research Grant for 2018 entitled *Polish Raison d’Etat in the Perspective of 2035*, falling under the code A.I.1.1; bursary No. 61, financed from the funds under decision No. 1/2018/GB of 7 Nov 2018 (contract No. GB/4/2018/208/2018/DA).
- 18 J. Ding, *Deciphering China’s AI Dream*, https://www.fhi.ox.ac.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.pdf (accessed on: 21 Oct 2019).
- 19 T. Dutton, *An Overview of National AI Strategies*, on: <https://medium.com/politics-ai/an-overview-of-national-ai-strategies-2a70ec6edfd> (accessed on: 20 Oct 2019).

at the War Studies University²⁰. The article also presents essential elements of technical knowledge concerning AI, based on the works of many distinguished researchers specializing in AI, particularly artificial neural networks and machine learning (Terrence Sejnowski²¹; Ray Kurzweil²²; Ian Goodfellow, Yoshua Bengio, Aaron Courville,²³ Robert A. Kosiński²⁴, and others). Interactions between the area of applied mathematics and algorithmization of stochastic processes and the phenomenon of chaos have been presented on the basis of a famous work by Peitgen, Jürgens and Saupe,²⁵ and elements of the bifurcation theory, including an analysis of the point of bifurcation in the US–China relations have been primarily taken, with some modifications, from the pioneer work by Ilya Prigogine, *From Being to Becoming*.²⁶ The concept of self-organized criticality (SOC) used in the analysis is based on an article written by pioneers of this approach to the analysis of complex dynamic systems evolving into a self-organized critical point of a phase transition – Per Bak, Chao Tang and Kurt Wiesenfeld.²⁷

Methods

The work uses the method of critical analysis of literature on the subject of international security, geopolitics, international relations, information technology, neurology, and applied mathematics. It also makes use of the logic of loops²⁸ as a method of interdisciplinary integration, as well as the idealization method and fractal analysis of the interaction between technological processes and social structures. Considering the very limited literature on the influence of new technologies on geopolitical processes, it was also necessary to adopt the logical function method and the heuristic approach. Other used methods included geopolitical analysis methods based on the analytical model developed by Robert

20 Bulletin No. 22, January 2019 of the Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University; Bulletin No. 19, October 2018 of the Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University; Special Issue of the Bulletin for the participants of the conference *Polish Analytical Community and Civilization Challenges in the Years 2020–2030*, 28 Nov 2019 – the Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University.

21 T. Sejnowski, *Deep Learning. Głęboka rewolucja. Kiedy sztuczna inteligencja spotka się z ludzką* [original title – The Deep Learning Revolution. Artificial Intelligence Meets Human Intelligence], Warszawa 2019.

22 R. Kurzweil, *Nadchodzi osłobliwość* [original title – The Singularity Is Near], Warszawa 2013.

23 I. Goodfellow, Y. Bengio, A. Courville, *Deep Learning. Systemy uczenia się* [original title – Deep Learning], Warszawa 2018.

24 R.A. Kosiński, *Sztuczne sieci neuronowe. Dynamika nieliniowa i chaos*, Warszawa 2014.

25 H.O. Peitgen, H. Jürgens, D. Saupe, *Granicechaosu. Fraktale*, Vol. 1–2, Warszawa 2002.

26 I. Prigogine, *From Being to Becoming. Time and complexity in the Physical Sciences*, New York 1980.

27 P. Bak, Ch. Tang, K. Wiesenfeld, *Self-Organized Criticality: An Explanation of 1/f Noise*, “Physical Review Letters”, Vol. 59 (4), 27 Jul 1984, pp. 381–384, on: https://pdfs.semanticscholar.org/5fdd/d5a5b4952032e4213f60595e9bf81d5532ed.pdf?_ga=2.26795381.971001938.1592004343-319393465.1592004343 (accessed on: 11 May 2020).

28 Basic assumptions of the logic of loops – see: P. Grochmalski, *Autorytaryzm centroazjatycki a kwestia transformacji systemowej – próba poszukiwania modelu metodologicznego*, in: *Przywódtwo, elity i transformacje w krajach WNP. Problemy metodologii badań*, T. Bodio (ed.), Vol. 1, Warszawa 2010, pp. 513–514.

A. Dahl and Bruce Stinebrickner,²⁹ as well as analytical and prediction methods applied in forecasting studies by the analytical and forecasting research team functioning at the Strategic Studies Institute of the War Studies University. Also crucial in the analytical process is the bifurcation point (BP) concept, which in a wider context refers to the bifurcation theory and the system stability analysis,³⁰ used to describe the critical point of imbalance of the analyzed American-Chinese rivalry system, as well as the self-organized criticality (SOC) concept.

Initial Assumptions and Theses

Sherman Kent is considered a pioneer of the methodology applied in the analysis of information provided by the American intelligence, and verifying its importance as to predicting future events. He also participated in reorganizing the potential of the American Intelligence Community after the Communists had taken over power in China in 1949. In his famous work, *Strategic Intelligence*, Kent emphasized the USA must base its policy toward the other states of the world on a specific kind of knowledge which it possesses thanks to strategic intelligence.³¹ America has built the world's biggest analytical potential, which after the end of the Cold War underwent yet another transformation. By recognizing main tendencies of the ongoing processes in the international environment, it was to support the state in making the best possible decisions to ensure sustainable leadership to the US. According to the geopolitical diagnosis made by Henry Kissinger in his *Diplomacy*, the domination by a single power of either of Eurasia's two principal spheres would be the biggest strategic danger to the USA. As he emphasized on the threshold of the 21st century: "That danger would have to be resisted even were the dominant power apparently benevolent, for if the intentions ever changed, America would find itself with a grossly diminished capacity for effective resistance and a growing inability to shape events."³² Many other American analysts unanimously consider this matter to be of fundamental importance to the USA. In the following analysis, this process constitutes, from the perspective of the USA and the PRC, a point of bifurcation, going beyond which will induce a qualitative change of roles and positions of the United States and communist China on a global scale. Despite the gradual, decades-long rise of the PRC to becoming a global power, the USA has failed to properly recognize the growing danger coming from the direction of China

29 R.A. Dahl, B. Stinebrickner, *Współczesna analiza polityczna* [original title – Modern Political Analysis], Warszawa 2007.

30 I. Stefanou, S. Alevizos, *Fundamentals of bifurcation theory and stability analysis*, on: https://www.researchgate.net/publication/334164186_Fundamentals_of_bifurcation_theory_and_stability_analysis (accessed on: 23 May 2020).

31 Full fragment: "Intelligence means knowledge. If it cannot be stretched to mean all knowledge, at least it means an amazing bulk and assortment of knowledge. This book deals with only a fraction of the total, but probably the most important fraction. It deals with the part, known to the intelligence trade as 'high-level foreign positive intelligence.' This phrase is short for the kind of knowledge our state must possess regarding other states in order to assure itself that its cause will not suffer nor its undertaking fail because its statesmen and soldiers plan and act in ignorance. This is the knowledge upon which we base our high-level national policy toward the order states of the world," Sherman Kent, *Strategic Intelligence*, Connecticut 1965, p. 3.

32 H. Kissinger, *Dyplomacja* [original title – Diplomacy], Warszawa 1996, p. 894.

or the possibility of approaching a point of bifurcation, which will cause a step change in the global system. The process of intensified competition between the two most powerful economies in the world overlaps with the beginning of a new technological revolution, at the core of which are AI technologies. They will provoke deep-reaching changes in international processes and lead to the emergence of a new geopolitical paradigm. “The smallest chance fluctuation can tip the balance and irrevocably determine the future fate of the system,”³³ which due to nonlinear processes will rapidly cross the bifurcation point. Such nonlinear dynamics can be found in physics and concern thermodynamic non-equilibrium. It cannot be directly transposed to the social realm, but the theory of bifurcation correctly characterizes highly complex processes approaching qualitative transformation. It reflects well the nonlinear dynamic model of a social process. The creator of the bifurcation theory observed that it combines deterministic and probabilistic analysis – it determines the historicity of a given process approaching a point of bifurcation, but the course, character and direction of the qualitative change are conditioned by fluctuations of probabilistic character.³⁴ A general theory describing the phenomenon of complexity does not exist yet³⁵. However, already in the late 1980s, researchers discovered a structure, whose type of complexity had specific characteristics – self-organized criticality (SOC).³⁶ Transposed to the analysis of the international space, it allows for building a rough model of crossing over from the logics of spatial geopolitics into geopolitics of datafication and algorithmization. The main research problem was the attempt to determine if the global confrontation between the USA and the PRC is currently entering the phase of critical point of imbalance of the international system, thus putting a strong pressure on the race to develop military AI technologies in order for one side to gain strategic dominance over the other. This process leads in consequence to the emergence of a new type of geopolitics based on the effective use of dataficated space and technological infrastructure in the rivalry.

- I** The first assumption of the work is the thesis that the USA mispredicted the direction of China’s evolution, which resulted in the emergence of a rival with potential bigger than that of the former Soviet Union.
- II** The current phase of the rivalry between the USA and China can be analyzed as self-organized criticality (SOC).
- III** The case of the USA–China rivalry, recognized as SOC, is approaching a point of bifurcation of the global system.
- IV** SOC, as a complex nonlinear process, has reached a certain level of autonomy and is coming close to a point of bifurcation, which forces the rivals to look for an area

33 P. Ball, *Masa krytyczna. Jak jedno z drugiego wynika* [original title – Critical Mass: How One Thing Leads To Another], Kraków 2007, p. 141.

34 I. Prigogine, *From Being to Becoming. Time and complexity in the Physical Sciences*, New York 1980, p. 106.

35 J.D. Barrow, *Kres możliwości? Granice poznania i poznanie granic* [original title – Impossibility: The Limits of Science and the Science of Limits], Opole 2005, p. 163.

36 P. Bak, Ch. Tang, K. Wiesenfeld, *Self-Organized Criticality: An Explanation of 1/f Noise*, “Physical Review Letters”, Volume 59, 27 Jul 1987, No. 4, pp. 381–384.

of confrontation beneficial to both sides. Both the USA and the PRC are becoming increasingly convinced that the main area in which a point of bifurcation will be reached in the strategic confrontation between them is AI technology and related fields. The conflict between the USA and China is entering the arms race phase, whose important element is AI technology.

V Due to mutual interdependencies, the rivalry to gain strategic dominance in the area of AI technology will enter the final phase of self-organized criticality and generate a new geopolitical area of rivalry – AI geopolitics, in which time and space will undergo local fluctuations and will be strongly linked to the information datafication and algorithmization process.

VI Within the new AI geopolitics, the pursuit of both countries to reach a point of bifurcation faster will create a risk of introducing untested AI technologies into the competing states' security structures. Their functioning may lead to a global catastrophe. The character and properties of self-organized criticality, its logarithmically growing complexity and sensitivity to perturbations brought about by unfinished elements of AI technology makes it increasingly harder to diagnose systemic risks, since the fractal structure of SOC provokes multiplication of risks and any given factor may cause an unexpected jump to the point of bifurcation and qualitatively change the system, which will then go beyond the limit of human competence to analyze it.

I. The USA mispredicted the direction of China's evolution, which resulted in the emergence of a rival with potential bigger than that of the former Soviet Union.

At the beginning of the 1970s, Richard Nixon's cabinet made a strategic turn in the relations with the People's Republic of China. L. H. Kissinger, who was, as the US Secretary of State, one of the fathers of this breakthrough, claims that for Nixon, opening to China was a part of a comprehensive strategic plan.³⁷ It was then that a consensus emerged among the American elites, who assumed that once China joins the global economy and opens to globalization, it will ultimately undergo democratization. Even the Tiananmen Square massacre committed in 1989 by the Chinese Communist Party, failed to change the attitude of the American establishment. After the incident, George H. W. Bush sent the US National Security Advisor, Brent Scowcroft, to Beijing on a secret mission during which he delivered to Deng Xiaoping a personal letter from the US president. In the letter, the president assured the Chinese leader of his intention to keep friendly relations between the two nations. In his memoirs, Bush claimed he did this because he believed that close economic cooperation with China would make this country, influenced by economic mechanisms, start turning its direction towards democracy.³⁸ In fact, however, the decisive factor was the size of the Chinese population, which would make hundreds of millions of future consumers of American products and the world's biggest reserve of cheap labor force. B. Góralczyk, who has

37 H. Kissinger, *O Chinach*, Wołowiec 2014, p. 244 [original title – *On China*], London 2012, p. 235.

38 G. Bush, B. Scowcroft, *Świat przekształcony* [original title – *A World Transformed*], Warszawa 2000, p. 99.

observed the evolution of the PRC since the 1970s, notices that “only now do the Americans start to realize that they have miscalculated, they have too often been tempted by the prospect of winning the vast Chinese market. They have been driven more by immediate success than strategic vision.”³⁹ The USA had long thought it would be able to understand China and influence its development. In 1967, Nixon stated: “The world cannot be safe until China changes. So our goal, to the extent that we can influence events, should be to bring about change.”⁴⁰

Kurt M. Cambell, one of the most influential analysts in the USA, for years a strong supporter of the cooperation with the PRC, thinks that this was actually the turning point. He said that: “Ever since, the assumption that deepening commercial, diplomatic, and cultural ties would transform China’s internal development and external behavior has been a bedrock of U.S. strategy”⁴¹. Those hopes proved to be a very costly mistake. As the author points out: “Diplomatic and commercial engagement have not brought political and economic openness. Neither U.S. military power nor regional balancing has stopped Beijing from seeking to displace core components of the U.S.-led system. And the liberal international order has failed to lure or bind China as powerfully as expected. China has instead pursued its own course, belying a range of American expectations in the process.”⁴²

An analyst, who for years co-created the USA’s erroneous strategy towards China, writes from today’s perspective: “The starting point for a better approach is a new degree of humility about the United States’ ability to change China. Neither seeking to isolate and weaken it nor trying to transform it for the better should be the lodestar of U.S. strategy in Asia. Washington should instead focus more on its own power and behavior, and the power and set of assumptions about China would better advance U.S. interests and put the bilateral relationship on a more sustainable footing.(...) the first step is relatively straightforward: acknowledging just how much our policy has fallen short of our aspirations.”⁴³

Thomas J. Christensen, between 2006-2008 U.S. Deputy Assistant Secretary of State under the leadership of President George W. Bush, believes that since the beginning of the reforms in China, no state has done more to increase China’s power than the USA. According to him, the USA itself has created the greatest threat to its global interests, stimulating the processes leading towards a global bifurcation point. Consequently, for the first time since the USA became a world power, its rival is a state with comparable economic potential and vast strategic culture based on historical experience.⁴⁴ Michael Pillsbury thinks that since the moment Chinese communists overthrew the republican government and established Communist China in 1949, the Chinese Communist Party has been implementing

39 B. Góralczyk, *Wielki renesans. Chińska transformacja i jej konsekwencje*, Warszawa 2018, p. 448.

40 R. Nixon, *Asia After Viet Nam*, “Foreign Affairs”, Vol. 46, No. 1, October 1967, pp. 111–125.

41 K. M. Cambell, E. Ratner, *The China Reckoning. How Beijing Defied American Expectations*, “Foreign Affairs”, Vol. 97, No. 2, March/April 2018, p. 60.

42 Ibidem, p. 61.

43 Ibidem, p. 70.

44 Th.J. Christensen *The China Challenge: Shaping the Choices of a Rising Power*, New York–London 2015, *Prologue*.

a strategy calculated for a hundred years, in order to beat the USA and dominate the world.⁴⁵ Graham Allison puts together data from 1980 and 2015 on the potential of the USA and the PRC. In 1980, China's GDP constituted 7 percent of America's GDP, and 35 years later it was 61 percent of America's GDP. Share in import rose from 8 to 73 percent, and in export from 8 to 151 percent.⁴⁶ At no point of the Cold War between the USA and the Soviet Union did Moscow exceed half of America's economic potential. It failed to lead the global system to a point of bifurcation and break American dominance.

II. The current phase of the rivalry between the USA and China can be analyzed as self-organized criticality (SOC).

China now has much bigger resources to use in the confrontation than the USSR ever did and is better prepared for the upcoming point of bifurcation of the global system. The PRC is also its main stimulator and increasingly influence the setting of boundary conditions for the global self-organized criticality (SOC). Robert Spalding, a retired US Air Force general, says that currently the Chinese Communist Party (CCP) is waging a "stealth war" against the USA and the entire West, and is doing it with great determination and using all available tools and measures of influence, in order to ensure its own victory⁴⁷. Spalding emphasizes that this stealth war is deeply rooted in China's ancient strategic culture. The characteristic feature of Chinese history is great pragmatism and patience in building advantage. Its strategic culture is based on perceiving the world as a space where everything is interconnected. By influencing one element, you obtain results in another element. In rivalry, the objective is to patiently increase your advantage to the point where the adversary loses the possibility to respond effectively. This strategy is clearly expressed in the political *Testament of Deng Xiaoping*. He left for his successors seven tips in the form of short advice (Chengyu) kept in the spirit of "Taoist diplomacy." The advice sets China's strategy for the future: *Lengjing guancha* – watch and analyze the development calmly; *Yousuo zuowei* – try to make some contribution; *Wenzhu zhenjia* – secure your own position; *Chenzhuo yingfu* – deal with the changes calmly and confidently; *Shanyu shouzhou* – be good at keeping a low profile; *Jue budangtou* – do not try to assume leadership; *Taoguang yanghui* – hide your capabilities and intentions.⁴⁸ Especially the last three pieces of advice show that Deng Xiaoping recommended great care in building strategic advantage over the USA while carefully hiding the whole process. If we look at this strategy from the perspective of self-organized criticality (SOC), we see that China, contrary to the USSR, is trying to conceal for as long as possible its actions aimed at reaching a point of bifurcation, and obtain capabilities which will let it give the impending SOC

45 M. Pillsbury, *The Hundred-Year Marathon: China's Secret Strategy to Replace America as the Global Superpower*, New York 2016.

46 G. Allison, *Destined For War: Can America and China Escape Thucydides's Trap?*, Boston 2017, p. 6.

47 R. Spalding, *Niewidzialna wojna. Jak Chiny w biały dzień przejęły wolny Zachód* [original title – Stealth War: How China Took Over While America's Elite Slept], Warszawa 2019.

48 *Multidimensional Diplomacy of Contemporary China*, S. Shen, J.-M.F. Blanchard (red.), Lanhan–Boulder–New York–Toronto–Plymouth 2010, s. 6; B. Góralczyk, *Wielki renesans. Chińska transformacja i jej konsekwencje*, Warszawa 2018, p. 161.

features beneficial to China. It is also noticeable that many elements of the Chinese strategy to reach a point of bifurcation perfectly reflect the strategy of a player striving to obtain spatial advantage in the board game *Go*. Patiently taking away from the adversary the possibility to maneuver will make them lose before they notice the critical moments of taking over control in the strategy adopted in the match.

III. The case of the USA–China rivalry, recognized as SOC, is approaching a point of bifurcation of the global system.

All subsequent leaders of the CCP followed the essential elements of Deng's guidelines. It was only Xi Jinping who openly talked about the China's strategic objectives – creating a Moderately Prosperous Society (*xiaokang shehui*)⁴⁹ for the 100th anniversary of establishing the Communist Party of China in 2021, and for the centenary of the People's Republic of China in 2049, achieving the China Dream (*zhongguo meng*), i.e. finishing the integration of all Chinese lands and celebrating a great renaissance of China as the world's greatest power (this objective has been placed in the context of the entire history of the Chinese civilization. This means that, according to the PRC's strategy, a bifurcation point of the global system should come about somewhere between 2021 and 2049. According to the CCP, the current “renaissance of the Chinese nation” (*Zhonghua minzu weida fuxing*, 中华民族伟大复兴)⁵⁰ is the third such breakthrough – after the Han dynasty and the Tang dynasty). Thus, from the perspective of China, the objective is to establish a new global order based on the Chinese system of values.

This means that China is openly on the course to dethrone the USA as the dominant power. Since the end of WWII, no state, including the Soviet Union, has presented such an extensive strategy of rivalry with the USA in key geostrategic, geoeconomic and technological areas. They make up a coherent concept of an extensive SOC space directed towards reaching at the right moment a point of bifurcation. The USA understood the scale of the Chinese threat too late to firmly and quickly regain the strategic dominance within the emerging SOC and slow down the ongoing process of the global system's bifurcation. However, it undertook actions aimed at building a coherent strategy to respond to China's challenge. In terms of history, the USA made the same mistake it had made after WWII, assuming the Soviet Union, due to the losses it suffered in the war, would have to open extensively to economic cooperation with the West. Only Georg F. Kennan accurately captured the essence of the Soviet strategy and worked out an effective response – the containment doctrine, which was consequently implemented by the USA throughout the Cold War, up until the collapse of Soviet Russia.⁵¹ This time, however, the change of strategy towards the country undermining the position of the USA came only when the Chinese Communist Party had already created strong instruments to exert economic, political and military influence upon the USA, as well as the global system. One of such instruments is the concept called *One Belt, One Road*, which is to

49 B. Góralczyk, *Wielki renesans...*, p. 363.

50 Ibidem, p. 364.

51 J.L. Gaddis, *Strategie powstrzymania* [original title – Strategies of Containment], Warszawa 2007.

accelerate the process aimed at reaching a point of bifurcation by the global self-organized criticality.

At the end of the 20th century, Zbigniew Brzeziński said that America had become the first and the only truly global superpower.⁵² He also correctly foresaw in 1997 that in 20 years' time China would catch up with the USA as a global power.⁵³ However, he mentioned quite a few problems that China would meet on its way to achieve that goal, and therefore concluded that even in the most advantageous circumstances the PRC would be unable to reach the position equal to the USA.⁵⁴ The current situation proves just how important, according to one of the most established American analysts, was for the US the area of security, to avoid such a scenario becoming reality. Two decades later, Gen. Robert Spalding analyzes the reasons why the USA had not taken active action in order to diagnose the risks posed by China and respond to them actively, but instead deactivated system protection measures against this communist state and stimulated the dysfunctionality of SOC. Emphasizing that China has achieved enormous technological advancement mainly by stealing Western technologies, he nevertheless notices that "what is unique about China is that it has done so while remaining one of the most closed, oppressive regimes in the world. Moreover, it has become the most technologically advanced IT-based authoritarian state in history by harnessing western innovation."⁵⁵ What the author does not notice though is that the PRC's achievements are an important effect of the analysis conducted by the Chinese elites of the process of rivalry between the USA and the USSR, and the reasons that led to the Soviet Union's collapse. Systemically, it was a program of thorough analysis of the characteristics of SOC and working out strategies for bifurcation process phases. China has been striving for the world to reach a bifurcation point in a situation strategically beneficial to the PRC.

As a consequence, both countries have entered a level of strategic rivalry which can even escalate to military confrontation, but with each side of the rivalry coming from an essentially different position – while the PRC is trying to prompt self-organized criticality in order for it to get through the phased process and give it essentially different characteristics, the USA is at the same time trying to slow down the dynamics of bifurcation processes in SOC. During a meeting of the leaders of both countries in 2015, Xi Jinping was to express a belief that if the main global powers keep making strategic mistakes, they will not be able to avoid conflict.⁵⁶ Two years later, China launched an unprecedented in its history program of expanding AI technology. The USA responded by preparing in 2019 its own comprehensive strategy to develop artificial intelligence.⁵⁷ Fareed Zakaria, in an

52 Z. Brzeziński, *Wielka szachownica. Główne cele polityki amerykańskiej*, Warszawa 1998, p. 28.

53 Ibidem, p. 200.

54 Ibidem, p. 206.

55 R. Spalding, *Clash of Strategic Cultures*, March 5, on: <https://nsiteam.com/social/wp-content/uploads/2019/03/Spalding-IP-Clash-Final-5Mar19R.pdf> (accessed on: 12 Sep 2019).

56 G. Allison, *Skazani na wojnę? Czy Ameryka i Chiny unikną pułapki Tukidydesa?* [original title – Destined for War: Can America and China Escape Thucydides's Trap?], Bielsko-Biała 2018, p. 8.

57 P. Scharre, *Killer Apps. The real Dangers of an AI Arms Race*, "Foreign Affairs", May/June 2019, Volume 93/ Number 3, p. 135.

extensive analysis published in "Foreign Affairs", points to the emergence in the USA of a new consensus between the military establishment, key media and a group of politicians, according to which China is currently a strategic threat to the USA. This new approach has been caused by the failure of the hitherto American policy, and the realization that a thoroughly new strategy should be developed. The author warns that a cold war with China will probably be much longer and more expensive than the conflict with the Soviet Union. He notices that many supporters of the American confrontation with China embrace the logic of "containment" from the period of the Cold War, claiming that such a hard line against China would reduce its position, and even precipitate the fall of its current regime. Zakaria belongs to a currently small group of analysts who warn against such thinking, as it may lead to the creation of a bipolar world, split between two camps.⁵⁸ In another article, Daniel W. Drezner draws attention to the weakness of the current US foreign policy and the inability to work out a common strategy among the elites.⁵⁹ This state of growing frustration is perfectly reflected in R. Spalding's analysis. He states that while China was building its leading position in many areas of economy, finance and technology, the West got more and more behind. At the time America was engaged in conflicts all around the world, thus failing to notice the pace with which China was building its potential. Hence, America's military capabilities underwent erosion, the US deprived itself of a vast production base which was moved to China, and on top of everything American scientists began to work for the East.⁶⁰

Graham Allison pointed to the real risk of the American-Chinese rivalry turning into an armed conflict. He referred to the so-called Thucydides's Trap, which shows the mechanism that provoked the hitherto dominant Sparta to start a war for dominance against the emerging power of ancient Athens. In his case study, Allison analyzed 16 most important historical instances of the strategic dilemma between a ruling and an emerging power, similar to that of Sparta and Athens. In 12 of those 16 instances, the situation ended in war.⁶¹ In fact, the pattern analyzed by Allison is a specific case among a wider group of dynamic structures approaching a bifurcation point. An analysis of such structures shows that even a seemingly unimportant factor may provoke a sudden qualitative change of the whole system. It is impossible to clearly indicate the time or character of such factor or group of factors, as there is a probabilistic correlation between cause and effect. However, we can assess the probability of approaching the bifurcation phase within a given process, considering the fact it has reached structural activation that must be overcome due to the system having exceeded the point of stability and reaching self-organized criticality.

58 F. Zakaria, *The New China Scare. Why America Shouldn't Panic About Its Latest Challenger*, "Foreign Affairs", January/February 2020.

59 D.W. Drezner, *This Time Is Different. Why U.S. Foreign Policy Will Never Recover*, "Foreign Affairs", May/June 2019, p. 10.

60 R. Spalding, *Clash of Strategic Cultures*, March 5, on: <https://nsiteam.com/social/wp-content/uploads/2019/03/Spalding-IP-Clash-Final-5Mar19R.pdf> (accessed on: 12 Sep 2019).

61 G. Allison, *Skazani na wojnę?...*, p. 287.

IV. SOC, as a complex nonlinear process, has reached a certain level of autonomy and is coming close to a point of bifurcation, which forces the rivals to look for an area of confrontation beneficial to both sides. Both the USA and the PRC are becoming increasingly convinced that the main area in which the point of bifurcation will be reached in the strategic confrontation between them is AI technology and related fields. The conflict between the USA and China is entering the arms race phase, whose important element is AI technology.

In July 2017, the Chinese government implemented a national AI development program.⁶² J. Ding emphasizes that the document “clearly outlines China’s ambition to lead the world in AI.”⁶³ Today, AI already influences virtually every element of reality. It is the main driving force of emerging technologies, such as big data, robotics and Internet of Things, and will continue to act as a technological innovator for the foreseeable future.⁶⁴ Research on AI has been ongoing since the mid-1950s. It was initially based on the concept of creating software able to intelligently react to a given problem. In the 1980s, a pioneer group of researchers decided to present an alternative approach to AI. They decided, basing on interdisciplinary brain research, it was advisable to build models copying certain cognitive functions of the brain. Ray Kurzweil considers reverse engineering of the human brain as the most important project in the universe.⁶⁵ Created algorithms had capabilities of learning systems.⁶⁶ Network models able to copy intelligent behavior were already built in the 1980s. The consequence was creating artificial neural networks, being an example of a complex system (CS). Human communities also belong to the CS group.⁶⁷ The key roles in this new approach to AI were played by works of Geoffrey Hinton on learning algorithms for Boltzman Machines,⁶⁸ the pattern recognition model developed by Christoph von der Malsburg,⁶⁹ the creation of Neocognitron by Kunihiko Fukushima – a model of a multilayer network based on the layered structure of the visual system, using convolutional filters and the Hebb rule for synaptic plas-

62 J. Ding, *Deciphering China’s AI Dream. The context, components, capabilities, and consequences of China’s strategy to lead the world in AI*, p. 31, on: https://www.fhi.ox.ac.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.pdf (accessed on: 12 Jan 2019).

63 Ibidem, p. 4.

64 M. Thomas, *The future of artificial intelligence. 7 ways AI can change the world for better ... or worse*, Bulletin June 8, 2019, on: <https://builtin.com/artificial-intelligence/artificial-intelligence-future> (accessed on: 12 Aug 2019).

65 R. Kurzweil, *Jak stworzyć umysł. Sekrety ludzkich myśli ujawnione* [original title – How to Create a Mind: The Secret of Human Thought Revealed], Białystok 2018, p. 22.

66 I. Goodfellow, Y. Bengio, A. Courville, *Deep Learning. Systemy uczące się* [original title – Deep Learning], Warszawa 2018, p. 3.

67 R.A. Kosiński, *Sztuczne sieci neuronowe. Dynamika nieliniowa i chaos*, Warszawa 2014, p. 15.

68 Ibidem, p. 579. Initially, the name Boltzman Machines was used to describe a model based only on binary variable. Vide: H. Ackley, G.E. Hinton, T.J. Sejnowski, “A Learning Algorithm for Boltzman Machines,” *Cognitive Science* 1985, No 9, pp. 147–169, on: https://onlinelibrary.wiley.com/doi/pdf/10.1207/s15516709cog0901_7 (accessed on: 23 Oct 2019).

69 C. von der Malsburg, *The correlation theory of brain function*, Max-Planck-Institut für Biophysikalische Chemie, Postfach 2841, D–3400 Göttingen, FRG, Internal Report, 1981.

ticity,⁷⁰ and, last but not least, building by Teuvo Kohonen a Self-Organizing Map (SOM),⁷¹ capable of learning to organize similar input data on a two-dimensional map. At the time, AI research on such level was undertaken almost entirely by Western scientific centers. China was far behind the USA and Europe in most fields of research. The PRC tried to change the situation by implementing in 1986 a State High-Tech Development Plan (the 863 Program). However, only adopting the National Basic Research Program of China (the 973 Program) in 1997 resulted in a noticeable increase of the scientific and research potential in China. The adopted strategy aimed at achieving a technological breakthrough using the strength of university research centers, as the industry was still mainly based on copying Western models, and characterized by low quality and low work efficiency. The CCP's assumptions for China achieving a technological breakthrough and building an advanced economy resulted in the implementation in 2006 a 15-year National Plan for Scientific and Technological Development, which was to help China become one of the most innovative economies in the world. However, research on AI was not mentioned among the scientific and technical priorities of the plan.⁷²

A strong impulse for the creation of a Chinese AI development program was something that happened in March 2016. The AlphaGo program, based on the MCTS (Monte Carlo Tree Search) heuristic search algorithm,⁷³ created by DeepMind Technologies (taken over by Google in 2014), beat the Korean champion and one of the top-ranked players in the world, Lee Sedol, in a match of Go. The fact was barely noticed in Europe, but in China the transmission of the match drew 280 million viewers.⁷⁴ According to Kai-Fu Lee, after this event China immediately plunged into a real AI fever.⁷⁵ In May 2017, the Chinese master Ke Jie was also defeated 3-0 in a three-game match by the updated algorithm AlphaGo 2.0.⁷⁶ Also in May 2017, the Chinese government organized a Go competition, inviting five best players to compete against AlphaGo, and again the humans were defeated by the program. Earlier, there had been a deeply rooted conviction among Western mathematicians, as well as Chinese IT specialists that creating a program which would be able to beat a professional Go player was impossible to achieve in the forthcoming decades, considering the

70 K. Fukushima, *Neocognitron: A Self-organizing Neural Network Model for a Mechanism of Pattern Recognition Unaffected by Shift in Position*, "Biological Cybernetics" No. 36, pp. 193–202 (1980), on: <https://www.rctn.org/bruno/public/papers/Fukushima1980.pdf> (accessed on: 12 Sep 2019).

71 T. Kohonen, *MATLAB – Implementations and Applications of the Self-Organizing Map*, on: http://docs.unigrafia.fi/publications/kohonen_teuvo/MATLAB_implementations_and_applications_of_the_self_organizing_map.pdf (accessed on: 12 Aug 2019).

72 S.S. Serger, M. Bredine, *China's Fifteen-Year Plan for Science and Technology*, "Asia Policy" No. 4, July 1, 2007, pp. 135–164, on: <https://www.nbr.org/publication/chinas-fifteen-year-plan-for-science-and-technology-an-assessment/> (accessed on: 27 Sep 2019).

73 T. Walsh, *To żyje! Sztuczna Inteligencja. Od logicznego fortepianu po zabójcze roboty* [original title – It's Alive! Artificial Intelligence from the Logic Piano to Killer Robots], Warszawa 2018, p. 51.

74 C. Metz, *What The AI Behind AlphaGo Can Teach Us About Being Human*, Wired, 19 May 2016, on: <https://www.wired.com/2016/05/google-alpha-go-ai/> (accessed on: 12 Aug 2019).

75 K-F. Lee, *Inteligencja Sztuczna, rewolucja prawdziwa. Chiny, USA i przyszłość świata* [original title – AI Superpowers: China, Silicon Valley, and the New World Order], Poznań 2019, p. 15.

76 Ibidem, pp. 13–14.

complexity and specific character of the game itself. In order to analyze the three upcoming moves, it is necessary to take into account 8 million possible combinations; to calculate 15 moves ahead, one needs to analyze more combinations than the number of atoms existing in the universe.⁷⁷ The total number of correct arrangements on the board is 10^{70} .⁷⁸ The number of atoms in the universe is 10^{90} .⁷⁹ The AlphaGo algorithm, next to several deep learning networks, applied back propagation through time. The way in which the algorithm played the game was surprising and creative. The most shocking for the Go players around the world was the 37th move made by the program in the second game of the match with Lee Sedol. In the whole history of this world's oldest strategy game, there was a fundamental rule that in the initial phase of Go, the stones are to be placed on the board along four external lines. However, the algorithm chose the fifth line. As it turned out later in the game, several dozen moves later, this initial decision gave AlphaGo strategic advantage and victory in the game. The situation proved that this type of algorithm tries out possible strategies that remain beyond human perception and creativity. For Chinese leaders, this was a sign that the critical point, not only in the game of Go, but also in the human history and machine intelligence, has been crossed. The game which used to be the foundation of the Chinese strategic culture reached a point of bifurcation.

In October 2017, a modified version of the algorithm, AlphaGo Zero, came out. It learned to play Go on the basis of the game rules only, and then beat the previous version of the program. AlphaGo Zero played 100 times faster and used 10 times less computing power than the previous version.⁸⁰ Tomy Walsh compares AlphaGo with the program Deep Blue, which defeated G. Kasparov in chess. He notices that "Deep Blue used specialized hardware to explore around 200 million positions per second. By comparison, AlphaGo evaluates only 60,000 positions per second. Deep Blue's approach used brute force to find a good move – but that does not scale well to the more complex game of Go. AlphaGo, by contrast, has a much better ability to evaluate positions, a skill learned from playing billions of games against itself."⁸¹

The fact that a company being a part of an American corporation and a founding member (along with IBM, Microsoft, Amazon and Facebook) of the "Partnership on AI," developed such an advanced algorithm, was a strong impulse for Chinese communist politicians to quickly increase funding for AI development in the PRC. They decided that skillful use of such software can significantly increase the USA's analytical capabilities and the accuracy of its strategic activities. It would also allow the USA to correctly interpret elements of Chinese strategy and radically weaken the bifurcation processes in the global SOC. On the other hand, introducing AI into China's internal policy by the CCP

77 Ibidem, p. 51.

78 T.J. Sejnowski, *Deep learning. Głęboka rewolucja. Kiedy sztuczna inteligencja spotyka się z ludzką*, Warszawa 2019, p. 31.

79 A.H. Guth, *Time Since the Beginning*, Cornell University, Astrophysics, 13 Jan 2003 (on-line), p. 8, on: <https://arxiv.org/abs/astro-ph/0301199> (accessed on: 20 Apr 2020). The value is accepted by most astrophysicists, although Guth estimates it is much higher, which arises from his concept of the so-called "eternal inflation" of the universe.

80 Ibidem, s. 34.

81 T. Walsh, *To żyje. Sztuczna inteligencja...*, pp. 101–102.

could increase the party's ability to control the society, strengthen internal stability, and help develop more effective strategies in the rivalry with the USA.

The Future of Humanity Institute (FHI) of the Oxford University has prepared a report entitled "Deciphering China's AI Dream," which is a deep analysis of the Chinese AI development program. FHI analysts point out that China has been systematically increasing expenditure for the development of artificial intelligence, but recently, there has been explosive growth in AI funding. Only in three years – from 2017 to 2020 – it is to be a tenfold increase.⁸² According to the report, the PRC created and implemented a strategy on expanding domestic AI technologies, using the capabilities of Chinese companies, supported and funded by the state and tightly connected with the army. China is also skillfully using huge amounts of data to develop AI, at the same time blocking the access to such information by foreign companies and scientific centers. Such sensitive data includes, for example, an extensive amount of information on the Chinese society, collected and analyzed within the social control system.⁸³ Considering its scale and extent, as well as implemented technologies and lack of substantial legal regulations limiting the use of such data by the state, it is a unique system that already allows China to monitor citizens and companies and to punish those who do not respect the rules established by the communist state. The gradually introduced system is to cover four areas of social activity – authority-citizen junction activities, all business activity, all social activities of people, and the area of legal interactions between the citizen and the state. More and more information collected by the system is stored in central databases with a view to creating an "online credit infrastructure" – ultimately, this active system of ongoing evaluation of citizen activities is to cover the entire Chinese population. Everyone is also to be included in the system of punishments enforced on citizens, ranging from economic sanctions, through regulating access to certain posts and social functions, limiting the possibility to purchase certain goods, to taking away the right to access some areas of everyday life (e.g. train or flight ban).⁸⁴ When the coronavirus epidemic broke out at the beginning of 2020, the system was tested and enriched with new instruments. China also has a huge data bank of systematically collected citizens' genetic information, as well as data connected with genome sequencing studies and related biological research results. The PRC also uses the expanded AI capabilities to collect sensitive information on the security infrastructure in other countries.⁸⁵ At the same time, China is developing a regional and national level system to

82 J. Ding, *Deciphering China's AI Dream. The Context, components, capabilities, and consequences of China's Strategy to lead the world in AI*, on: https://www.fhi.ox.ac.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.pdf, p. 3 (accessed on: 12 Jan 2019).

83 E. B. Kania, *Minds at War. China's Pursuit of Military Advantage through Cognitive Science and Biotechnology*, "PRISM, The Journal of Complex Operations" 2019, Vol. 8, No. 3, p. 11.

84 *Sposoby kontroli obywateli w oparciu o technologię big data. Modele amerykański i chiński. Analiza*, 31.08.2019, in: Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University, Bulletin No. 28, July/August 2019, pp. 42–43.

85 J. Ding, *Deciphering China's AI Dream. The Context, components, capabilities, and consequences of China's Strategy to lead the world in AI*, on: https://www.fhi.ox.ac.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.pdf, p. 4 (accessed on: 12 Jan 2019).

search for and recruit people with particularly good computer skills. The biggest companies are also opening foreign branches, with a view to finding and recruiting the most talented people. They are offered attractive scientific internships or a chance to conduct research in China.⁸⁶ The aforementioned FHI report stresses the particular emphasis placed on the development of robotics and intelligent production processes, which are to rely on domestic solutions and technologies.⁸⁷

According to the national artificial intelligence development plan, before 2020 China is planning to develop its AI-related industry to the level of countries most advanced in this area. There are also long-term plans. Up to the year 2025, the CCP wants to achieve predominance in some areas of AI, and up to 2030 China is to become a global center of AI research and innovations (the profits from this branch in China are to exceed 60.3 billion USD).⁸⁸ The FHI report points out that China has made the biggest progress in building supercomputers. In 2014, the USA's share in the Top500 list consisted of 232 systems (46.4%), with China having only 76 systems (15.2%), but already 3 years later, the Top500 list from June 2017 saw China boasting 159 supercomputers (31.8%), almost as many as the USA with its 168 systems (33.6%).⁸⁹ More importantly, the report indicates that China had already been ahead of the USA in 2014 in the number of AI-related patent registrations and scientific articles devoted to *deep learning* processes. However, China still lags behind the USA in fundamental research.⁹⁰ The report indicates that an increasing number of analysts notice that the AI strength developed by the USA and the PRC can provide a decisive strategic advantage of one of these states over the other⁹¹. Other countries remain far below the level obtained by the USA and China.⁹²

Chinese plans of accelerating AI development were preceded by adopting by the CCP in May 2016 a national strategy based on innovations. It was decided that China has a one-of-a-kind opportunity to get ahead of the USA by becoming the leader of the technological revolution,⁹³ which would result in taking global control over the SOC phase transition and elements of the bifurcation process. A particular emphasis was placed on the quick development of scientific and technological military potential. The program makes use of the strong connection between the Chinese military sector and the state. China created a national concept of a military-civil fusion (*junmin ronghe*), whose main goal is to pre-

86 Ibidem, p. 5.

87 Ibidem, p. 10.

88 Ibidem.

89 Ibidem, p. 24.

90 Ibidem, p. 26.

91 Ibidem, pp. 32–33.

92 For example, the authors of a Hindu report on AI of 2018 indicate that the level of research and the degree in which AI is implemented in India is very limited. Only one-fourth of companies use AI in any form. See: National Strategy For Artificial Intelligence, NITI Aayog, on: <https://niti.gov.in/sites/default/files/2019-01/NationalStrategy-for-AI-Discussion-Paper.pdf> (accessed on: 25 Oct 2019).

93 "The Central Committee of the CCP and the State Council publish the *Outline of the National Innovation-Driven Development Strategy* [中共中央国务院印发《国家创新驱动发展战略纲要》], *Xinhua*, 19 May 2016, http://news.xinhuanet.com/politics/2016-05/19/c_1118898033.htm (accessed on: 12 Feb 2020).

pare the army to operate in intelligent warfare.⁹⁴ Within the frame of reorganizing the armed forces, the Science and Technology Commission existing at the General Armament Department of the People's Liberation Army was moved in January 2016 to the Central Military Commission of the Central Committee of the Communist Party of China. In 2017 it was turned into the Central Science and Technology Commission (中国共产党中央军事委员会), directly supervised by Xi Jinping (leader of the Central Military Commission). The institution is to play a similar role in China as the Defense Advanced Research Projects Agency (DARPA) in the USA.⁹⁵ Its director is Gen. Liu Guozhi. As he said in a press interview: "Artificial Intelligence will accelerate the process of transforming the army, ultimately leading to a deep revolution in military matters. (...) Combining AI with human intelligence can be an optimum solution, and hybrid human-machine intelligence will be the highest form of future intelligence."⁹⁶ In the course of work on the development of military technologies using AI, China is focusing on hybrid intelligence systems (混合智能), a combination of human and machine intelligence. China is aiming at achieving "synergy between brain science, AI and biotechnology, which is to have huge consequences for the future military force."⁹⁷ The Chinese are conducting research that will enable combining human and machine intelligence.⁹⁸ One of such projects is the China Brain Project, executed since 2016, with the perspective to 2030. Mu-ming Poo, the director of the Chinese Institute of Neuroscience (ION) and the Centre for Excellence in Brain Science and Intelligence Technology of the Chinese Academy of Sciences (CAS), emphasizes: "Compared with the other projects, CBP is more comprehensive in nature; it covers basic research on the neural basis of cognitive functions, applied research in developing methods for diagnosis and intervention of brain disorders, as well as brain-inspired computing methods and devices."⁹⁹

An additional coordinator in the implementation of the military-civil fusion strategy is to be the Military Steering Committee for Scientific Research, also created at the Central Military Commission.¹⁰⁰ It is to set research priorities and strategic directions of development for military technologies. He Fuchu, a Chinese general, a former president of the Military Medical Academy of Science, and later a vice-president of the Academy of Military Sciences, points to the necessity to militarize biotechnology and combine it with

94 E.B. Kania, *Minds at War. China's Pursuit of Military Advantage through Cognitive Science and Biotechnology*, "PRISM", Vol. 8, No. 3/2019, p. 84.

95 "Co wiadomo o 'chińskiej DARPA'? Analiza", in: Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University, Bulletin No. 28, July/August 2019, p. 22.

96 Gen. Liu Guozhi, *Developing an intelligent military system is a strategic chance for our army to jump the gap*, (刘国治中将:军事智能化发展是我军弯道超车的战略机遇), CCTV News, 22 Oct 2017, on: <http://mil.news.sina.com.cn/china/2017-10-22/doc-ifymzqqq3312566.shtml/>.

97 E.B. Kania, *Minds at War. China's Pursuit of Military Advantage through Cognitive Science and Biotechnology*, "PRISM", Vol. 8, No. 3/2019, p. 83.

98 Ibidem, p. 84.

99 Ling Wang, Interview. Mu-ming Poo: China Brain Project and the Future of Chinese neuroscience, in: National Science Review 24 February 2017, on: https://www.researchgate.net/publication/314070218_Mu-ming_Poo_China_Brain_Project_and_Future_of_Chinese_Neuroscience (accessed on: 12 Feb 2020).

100 *Co wiadomo o 'chińskiej DARPA'? Analiza...*, p. 22.

nanotechnology and AI in order to use it on the future battlefield. In his opinion, China should take into account that future warfare will encompass the domain of the human conscious, and the brain will become the battlefield of the future. Therefore, China should develop models integrating human and artificial intelligence.¹⁰¹

In 2017, Gen. Yang Xuejun became the head of the Academy of Military Sciences of the Chinese People's Liberation Army, the main body developing military strategy. In 2010, he developed a supercomputer called Tianhe – 1A, which at the time was the fastest computer in the world. This expert on supercomputers and parallel and distributed computing in the context of AI research, was responsible for the creation of the National Innovation Institute of Defense Technology (NIIDT – 中国人民解放军军事科学院国防科技创新研究院). A perfect proving ground for the Chinese military sector was the possibility to test many solutions during the fight with COVID-19, due to the fact that the military and the civil sector in China are highly intertwined. Chinese military analysts decided that the pandemic provides perfect research material for the analysis of the global SOC and the possibility to position and exert soft influence on *bifurcation processes*.

V. Due to mutual interdependencies, the rivalry to gain strategic dominance in the area of AI technology will enter the final phase of self-organized criticality and generate a new geopolitical area of rivalry – AI geopolitics, in which time and space will undergo local fluctuations and will be strongly linked to the information datafication and algorithmization process.

Among many trends that dominate modern geopolitics, we can observe a conceptual and an operational approach.¹⁰² Chinese authorities presume that geopolitics based on technologies, mainly related to AI, is to become a frame for converting the Eurocentric way of perceiving geographical space into a Sinocentric one. Already in 2013, Xi Jinping announced adopting a massive geopolitical strategy, which was ultimately called the “Belt and Road Initiative.” According to R. Spalding, its main goal is to re-establish the historical position of the People's Republic of China in the world. The implementation of the strategy is therefore to lead to fundamental geopolitical changes in Eurasia and solve, in China's favor of course, Mackinder's paradigm, included by Kissinger in the fundamental rule of the US policy – oppose attempts to take control of Eurasia by a single state. An important element of the Chinese strategy is to take over and control the infrastructure of the Internet of Things technology as a new frame for technological and information systems supported with the Chinese 5G standard. The key to undertaking these activities is gaining strategic advantage in the field of AI. In this new geopolitical paradigm, the new realm of rivalry and expanding influence is not the cartographic or geophysical space, but rather the space made up of digitalized frames, based on the technology of collecting

101 E.B. Kania, W. VornDick, *China's Military Biotech Frontier: CRISPR, Military-Civil Fusion, and the New Revolution in Military Affairs*, China Brief, Volume: 19 Issue: 18, The Jamestown Foundation, on: <https://jamestown.org/program/chinas-military-biotech-frontier-crispr-military-civil-fusion-and-the-new-revolution-in-military-affairs/> (accessed on: 12 Feb 2020).

102 K. Świder, Introduction, in: P. Eberhardt, *Rozwój światowej myśli geopolitycznej. Wybrane zagadnienia*, Warszawa 2016, p. 14.

and analyzing data, detached from space as perceived by the classical geopolitical approach. The first state to build its AI-based strategic capabilities will be able to achieve dominance in prognostics and use this advantage in a way that AlphaGo used it in move 37 in the match against Le Sedol. It will provide China with competitive edge that will become clearly noticeable only when a global bifurcation point is crossed. A perfect example is the global pandemic, which shook the former scenarios and resulted in the emergence of many new factors that are hard to evaluate. Dozens of mathematical models based on AI have been created to determine the future processes related to the spread of the pandemic.¹⁰³ The states which have faster tools to build analytical models and a bigger base of input data, are able to quickly gain advantage. Using a well-developed AI infrastructure, they can adopt a better strategy for going out of crisis and successfully managing the rivalry with other states. Before the pandemic situation, Jaysree Pandya had already emphasized that “as nations have already started feeling the impact of emerging artificial intelligence systems, the question is how will the AI trends define and determine the global trajectory in the coming years? It seems geopolitical factors will likely play a determining role in the process.”¹⁰⁴ The coronavirus pandemic accelerated the implementation of AI on a wider scale and provided a strong impulse in the current, initial phase of AI explosion. At this point, it is hard to specify in what degree the US political elites are aware that the coronavirus epidemic will increase the dynamics of the US-China rivalry for maintaining or gaining (by the PRC) strategic dominance. Jaysree Pandya is certain that “as artificial intelligence gives its creator/developer the power to create and control conflict at all levels, the race for infrastructure, data and intelligence are on for economic and security supremacy.”¹⁰⁵ The author points out that “artificial intelligence is shifting the balance of power, and the new emerging reality of every nation for itself seems to be a highly destabilizing event for global peace and security and the future of humanity.”¹⁰⁶ Kai-Fu Lee, one of the most outstanding Chinese theoreticians and practitioners in the field of AI, for many years connected with American corporations such as Apple, Silicon Graphics Inc., Microsoft, Google, currently working for the Chinese AI sector, thinks that artificial intelligence will increase the disproportion in the economic development of particular states. He says that “AI will deprive poor countries of the opportunity to kick-start economic growth through

103 B. Ivorra, M.R. Ferrández, M. Vela-Pérez, A.M. Ramos, *Mathematical modeling of the spread of the coronavirus disease 2019 (COVID-19) taking into account the undetected infections. The case of China*, on: https://www.researchgate.net/publication/340114074_Mathematical_modeling_of_the_spread_of_the_coronavirus_disease_2019_COVID-19_taking_into_account_the_undetected_infections_The_case_of_China (accessed on: 12 Mar 2020); Y. Li, B. Wang, R. Peng, Ch. Zhou, Y. Zhan, Zh. Liu, X. Jiang, B. Zhao, *Mathematical Modeling and Epidemic Prediction of COVID-19 and Its Significance to Epidemic Prevention and Control Measures*, on: <http://www.remedypublications.com/open-access/mathematical-modeling-and-epidemic-prediction-of-covid-19-and-its-significance-5755.pdf> (accessed on: 22 Mar 2020); J.R. Koo, A.R. Cook, M. Park, Y. Sun, H. Sun, J.T. Lim, and oth. *Interventions to mitigate early spread of SARS-CoV-2 in Singapore: a modeling study*, on: [https://www.thelancet.com/journals/lancet/article/PIIS1473-3099\(20\)30162-6/fulltext](https://www.thelancet.com/journals/lancet/article/PIIS1473-3099(20)30162-6/fulltext) (accessed on: 18 Mar 2020).

104 J. Pandya, *The Geopolitics of Artificial Intelligence*, “Forbes”, January 28, 2019, on: <https://www.forbes.com/sites/cognitiveworld/2019/01/28/the-geopolitics-of-artificial-intelligence/#3959876d79e1> (accessed on: 10 Nov 2019).

105 Ibidem.

106 Ibidem.

low-cost exports, the one proven route that has lifted countries like South Korea, China, and Singapore out of poverty.”¹⁰⁷ He claims that China, due to the character and model of its society and economy, has advantage over the USA in the rivalry for predominance in AI.¹⁰⁸ Gen. Robert Spalding draws attention to the emerging frames of strategic rivalry for the new form of geopolitics. He thinks that China is currently implementing the global “Silk Road” project on two levels – economic and infrastructural. The latter is crucial for China, which wants to create foundations for the new space they want to control. By inter-connecting states using a network of economic projects, China wants to build a strong basis for integrating the new area by means of the Chinese 5G technology, which will naturally create new geopolitics with a new, systemic center. This, in turn, will allow China to make countries using the system dependent on Chinese technology and Big Data. Jayshree Pandya claims that “Since artificial intelligence could disrupt the process by which nations develop, it will be critical in determining national trajectories. The nations with the best chance of even approaching that accomplishment are perhaps those that have a wealth of AI human resource capital at their disposal, like the US, China, and many other developed nations and even India.”¹⁰⁹

Fundamentally, however, the new AI geopolitics is based on data explosion. Already at the end of the previous century, Robert Keohane and Joseph Nye in a well-known article published in “Foreign Affairs”, pointed to the growing geopolitical role of information. They emphasized that only a small part of information, the so-called “strategic information” concerning crucial state secrets and sensitive data on the state, requires tight protection as it is important from the perspective of national defense and international security.¹¹⁰ However, Eric Rosenbach and Katherine Mansted point out that due to modern technologies and the character of the infosphere, every piece of information now has the potential to be strategic.¹¹¹ Thus, we are dealing with the emergence of the geopolitics of information. The coronavirus pandemic made this fact perfectly clear, when the information on its DNA structure became strategic data, and statistics concerning its spread across the world had enormous influence on decisions taken by most states. The pandemic proved how much of a strategic advantage can be gained by a state which, using its AI analytical capabilities, utilizes its knowledge in the global economic and political rivalry undertaken in such extreme conditions. This can actually be the mentioned bifurcation point of the system, a breakthrough point for shaping the frames of the new geopolitics. In this new reality, global rivalry will no longer focus on gaining control over Eurasia in terms of geography, but on obtaining the capability to act on many levels in order to build a stable and irreversible geostrategic dominance in acquiring and possessing a privileged access to dataficated information bases and algorithmic tools to analyze them.

107 K.-F. Lee, *Inteligencja sztuczna...*, p. 178.

108 Ibidem, p. 128.

109 J. Pandya, *The Geopolitics...*

110 R. Keohane and J.S. Nye Jr, *Power and Independence in the Information Age*, “Foreign Affairs”, Sep/Oct 1998, p. 85.

111 E. Rosenbach, L. Mansted, *Geopolitics of Information*, Belfer Center for Science and International Affairs, Harvard Kennedy School, 28 May 2019, p. 5.

VI. Within the new AI geopolitics, the pursuit of both countries to reach the point of bifurcation faster will create a risk of introducing untested AI technologies into the competing states' security structures. Their functioning may lead to a global catastrophe.

The character and features of self-organized criticality, its logarithmically growing complexity and sensitivity to perturbances caused by unfinished elements of AI technology makes it harder and harder to diagnose systemic risks. The fractal structure of SOC causes multiplication of risks and any given factor may bring about a sudden jump to the point of bifurcation, qualitatively changing the system which will go beyond the limits of human competence to analyze it and understand the processes occurring within such new system. Luc Steels developed a program that enabled a group of robots to generate their own, entirely new, creative language. It was internally and communicatively coherent, but at the same time incomprehensible to the researchers (the robots had to show the humans the correlation key in order for them to understand the language). This Belgian scientist claims that wireless communication devices are beginning to show properties of complex adaptive systems. He emphasizes that “they behave like *«smart mobs»*”¹¹² that spontaneously self-organize and develop communication protocols adapted to their needs.”¹¹³

The coronavirus pandemic accelerated collection of data on social processes and their dynamics, and led to introducing new applications of AI. There was a qualitative jump in the process of global datafication. It gave a deeper meaning to a certain property of the world, which is based on the assumption of frequency stability.¹¹⁴ M. Heller notices that it “gives the world a certain attribute that makes it probabilistically researchable.”¹¹⁵ Deep learning algorithms have opened the way to studies adopting analytical mechanisms used by our neuronal structures. Strong analytical tools help to quickly develop the capability to better assess strategies whose implementation will ensure gaining advantage over the adversary. They also accelerate research aimed at creating AI projects that will enable the victorious side to first reach the point of bifurcation and thus gain strategic dominance. Modifying Nick Bostrom’s concept regarding the conditions necessary to reach a critical point in the development of the so-called Superintelligence, it must be assumed – with high probability – that projects implemented by the USA and the PRC are not similar enough to simultaneously reach the point of bifurcation.¹¹⁶

The consequences of the coronavirus increase the pressure on both the USA and China to focus their efforts on obtaining the technological capability to outrun the rival in the as-

112 *Smart mob* – a term coined by Howard Rheinholt. It describes group behaviors that arise from and are a consequence of using modern communication technologies, such as a wireless network, etc.

113 L. Steels, “Evolving grounded communication for robots,” p. 2, on: <http://cogsci.eecs.qmul.ac.uk/oldpages/miscom/steels-trends.pdf> (accessed on: 12 Feb 2020).

114 M. Heller, *Filozofia i wszechświat*, Kraków 2006, p. 13.

115 Ibidem.

116 N. Bostrom, *Superinteligencja. Drogi, niebezpieczeństwa, strategię*, Gliwice 2016, p. 125; original title: *Superintelligence. Paths, Dangers, Strategies*, Oxford 2014, p. 100.

assessment of processes, and using that advantage to accelerate the development of their AI analytical capabilities. However, there exists a certain barrier of unpredictability, since the analysis concerns to a significant extent nonlinear processes, specific to self-organized criticality. Of course, efforts can be made to describe and approach a nonlinear process with a linear process. However, as M. Heller says, “there are nonlinear processes that cannot be approached with any linear processes.”¹¹⁷ The American-Chinese rivalry for obtaining strategic dominance in the field of AI gives the winner a chance to get past the bifurcation point in a way that will give this qualitative jump process characteristics permanently strengthening its strategic advantage. However, the very character of the jump over the system’s bifurcation, as well as the pressure to do it as quickly as possible, causes a risk that the strategic rivalry will utilize faulty algorithms, which will pose a real threat to the functioning of security structures on a global scale. The AlphaGo algorithm already proved that people cannot understand the way in which it becomes creative, since it is impossible to analyze its decision tree step by step. Nevertheless, conclusions drawn from fractal analysis show that complicated shapes existing in nature do not necessarily have to be an outcome of equally complicated processes. This might also be true about the Internet environment which will increasingly focus on internal communication with various kinds of devices, sensors and autonomous systems. Benoit B. Mandelbrot notices that one of the fundamental scientific paradigms said that “a complex structure is an effect of complex and interrelated processes.”¹¹⁸ However, due to fractal geometry and the chaos theory we know that complex patterns are likely to have come into being as a result of a very simple process. This also means that when analyzing a simple process, we should not delude ourselves we will easily understand the rules behind it.”¹¹⁹ Kurzweil points out that even in the current phase of developing algorithms used in pattern-recognition systems, in practice they exhibit such subtle and complex behaviors that they are not predictable by the designer.¹²⁰

Robert H. Latiff draws attention to one more structural risk posed by AI. The currently developed systems based on AI are getting increasingly complex, but also more and more integrated with one another. While we are able to determine conditions and rationally assess the effects of the activity of several elements, it goes beyond our analytical capabilities to analyze how a highly complex system, based on, for example, an intelligent nano-robot structure, will function. According to Latiff, it already exceeds our capabilities to understand such complex and elaborate systems.¹²¹

It is obviously impossible to simply apply mathematical models and fractal geometry analyses to describe social processes. However, by way of algorithms, AI technologies will

117 M. Heller, *Filozofia i wszechświat*, Kraków 2006, p. 13.

118 B.B. Mandelbrot, *Podstawa geometrii fraktalnej: sprzężenie zwrotne i iterowanie* [original title: Basics of Fractal Geometry: Feedback and Iteration], in: H.-O. Peitgen, H. Jürgens, D. Saupe, *Granice chaosu. Fraktale* [original title: Chaos and Fractals], Vol. 1–2, Warszawa 2002, p. 40.

119 Ibidem.

120 R. Kurzweil, *Nadchodzi osobliwość. Kiedy człowiek przekroczy granice biologii* [original title: The Singularity is Near: When Humans Transcend Biology], Warszawa 2013, p. 432.

121 R.H. Latiff, *Wojna przyszłości. W obliczu nowego globalnego pola bitwy* [original title: Future War. Preparing for the New Global Battlefield], Warszawa 2018, p. 80.

more and more often combine applied mathematics and socio-economic phenomena. The main theses presented in the article reflect the growing methodological and cognitive dualism caused by the character of the analyzed processes which seem to be approaching a systemic bifurcation point.

A renowned sociologist, Charles Wright Mills, created in 1959 the notion of sociological imagination – the awareness of the relationship between personal experience and the wider society.¹²² Today, the international analytical environment should bear a particular kind of responsibility to try to interpret and predict phenomena and processes which will shape our future – they should have strategic imagination, understood as an ability to take responsibility for the consequences of the strategic rivalry for dominance in the field of artificial intelligence. It is necessary to give more and more consideration to the new logic of risk, taking into account risks connected with introducing into AI-based security systems undertested solutions which – due to unnoticed faults – will introduce risks in security systems of the USA or China. Paul Scharre states: “the emerging narrative of an »AI arms race« reflects a mistaken view of the risks from AI – and introduces significant new risks as a result.”¹²³ He thinks striving to obtain strategic advantage in the ongoing technological race will induce states, mainly the USA and China, to exert such strong pressure that the likelihood of introducing underdeveloped AI algorithms into security systems will dramatically rise and as a result lead to an unintentional catastrophe. It is therefore very important to use strategic imagination in order to create legal mechanisms that will start treating AI-related risks in the same way humanity treats weapons of mass destruction. However, even such regulations are unable to guarantee that authoritarian systems, mainly the PRC, will not use AI aggressively.¹²⁴

Conclusions

The current rivalry between the USA and the PRC has new characteristics which increasingly disrupt the global system and intensify its drift towards a point of bifurcation in order for one of the sides to obtain strategic dominance. It is highly probable that the AI development projects executed by the USA and China are not similar enough, and the level of their implementation differs significantly enough, to reach the bifurcation point at the same time. If we adopt the idealization method and reduce the global system to the form of a complex adaptive system (CAS), then it has a tendency to exponential generation of information and approaches self-organized criticality (SOC), in which a rapid system disruption process can take place according to a logarithmic curve. This leads to an explosion of AI technologies, which are to act against reaching by the disrupted system increased connectivity and emergence. The actions undertaken by the USA and the PRC indicate both states

122 Ch.W. Mills, *The Sociological Imagination*, Oxford 1959, p. 16.

123 P. Scharre, *Killer Apps. The real Dangers of an AI Arms Race*, “Foreign Affairs”, May/June 2019, Volume 93, Number 3, pp. 135–144.

124 It is pointed out by the authors of a report prepared by key institutions specializing in AI – see: *The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation...*

find it highly probable that in the perspective of the next two decades the system will reach a point of bifurcation, which will lead to its sudden change. Both states also believe developing AI technologies will enable them to become the main beneficiaries of the bifurcation process. Currently, the main conflict does not take place on the battlefield but in all the places that create the potential to collect and store enormous amounts of information, intensifying the development of AI technologies. The aim is to obtain advantage in the infrastructure of acquiring data and to enforce new global standards, as well as gain dominance in the application of AI technologies. There is also a realistic scenario in which one of the states uses the acquired technology to conduct an extensive strategic game with the rival state, thus gaining the opportunity to have significant impact on the shaping of the new CAS and new geopolitics of space and time, based on the system's connectivity, as well as the so-called space of possibilities (SP). Currently both states, the USA and China, are blaming each other for taking advantage of the coronavirus situation in the rivalry. The state that would use well-developed AI technology to analyze such processes could actually reach for this kind of influence tool as a leverage to gain strategic advantage.

The growing political pressure to accelerate the rivalry in the field of AI by both states can also result in introducing to the global infosystem faulty algorithmic solutions. In the strive to come out victorious from the rivalry, the politicians and the society will be ready to accept introducing technologies which had not undergone enough testing. The example of the AlphaGo proved that creativity of algorithms can sometimes be surprising even for the creators. The pressure to introduce autonomous systems on a wide scale blurs the line between military and civil structures and limits the politicians' space for decision-making. The existing AI systems are becoming more and more advanced and complex, but are also unreliable when implemented in other than dedicated environment.¹²⁵ The AlphaGo algorithm has properties of a meta-algorithm, it can be effectively used to search for functional strategies of operation in various, essentially different data environments, but its decision trees are uninterpretable for humans. That is why we need to consider if AI technologies should require similar legal frames as the ones created to regulate the use of mass destruction weapons.

To sum up, taking into account the set research problems, it must be stated that:

- I** The first thesis of the work has been verified positively. There is a considerable amount of literature on the subject that confirms the USA's erroneous predictions as to the direction of the PRC's development, which made it much easier for China to build enough potential to engage in the rivalry with the USA.
- II** The use of the self-organized criticality (SOC) model to analyze the current phase of the USA-China rivalry is cognitively justified.
- III** A strong vector of a dynamic process was indicated, which makes it highly possible that the case of the rivalry between the USA and the PRC, expressed as SOC, is moving towards a bifurcation point of the global system.
- IV** It is justifiable to consider that both sides of the confrontation decided that the main area in which a bifurcation point will be reached is AI technology and related fields, since it will guarantee strategic dominance to the winning side.

125 P. Scharre, *Killer Apps...*, pp. 135–136.

V It is also justifiable to think that the current level of rivalry will soon lead to approaching the moment of self-organized criticality by one of the sides. We can already observe the emergence of a new geopolitical area of rivalry – the so-called AI geopolitics, in which vectors of time and space are tightly integrated with the process of datafication and algorithmization of information.

VI The verification of the last thesis seems to remain an open matter. While the growing pressure to accelerate the process leading to obtaining a point of bifurcation by both states is clearly noticeable, it remains difficult to determine the level of likelihood that the new AI geopolitics encourages introducing undertested AI technologies into security structures of the competing states, which can result in a global catastrophe. It is unquestionable, though, that the character and properties of self-organized criticality, and particularly its logarithmically growing sensitivity to perturbations, with increased pressure for new AI technologies, limits and hinders their diagnostics. Additionally, the emergent structure of SOC leads to the multiplication of risks.

Therefore, the scope of analysis covering the last thesis requires further intensive research. Due to the significant dynamics of the processes described in the paradigm of self-organized criticality and phenomena related to the systemic point of bifurcation, the article is a new proposal for systemization and analysis of the processes described. However, the main research problem which was positively verified and which conditions the remaining areas of the conducted analysis, was the attempt to determine if the ongoing global confrontation between the USA and the PRC is currently in the phase of critical point of imbalance of the international system, which must exert strong pressure on the race to develop military AI technologies in order for one of the sides to gain strategic advantage over the other. As shown by analyses conducted on the subject, the process conditions the emergence of new AI geopolitics, focused on the effective use in the rivalry of dataficated space and technological infrastructure based on architecture using emergent algorithmic systems. ■

STRESZCZENIE:

W artykule wskazano, że obecnie strategiczna rywalizacja Chińskiej Republiki Ludowej ze Stanami Zjednoczonymi o zdobycie lub utrzymanie globalnego przywództwa jest bliska osiągnięcia punktu bifurkacji. Szczególnej dynamiki proces ten nabierze w obszarze sztucznej inteligencji (Artificial Intelligence – AI). Oba państwa uznają, że jest on kluczowy dla uzyskania strategicznej dominacji nad rywalem. Prowadzi to do przyspieszonego rozwoju technologii AI oraz jej coraz większego wpływu na procesy gospodarcze, polityczne i społeczne. Dodatkowo silnym katalizatorem tego procesu stała się pandemia koronawirusa.

USA i ChRL zdominowały rywalizację o technologiczne wykorzystanie potencjału AI. Ich konfrontacja na tym polu wchodzi w fazę krytycznego punktu systemu międzynarodowego i skutkuje dużą presją na wyścig w rozwoju militarnych technologii AI, a także tworzeniem się nowej geopolityki, opartej na skutecznym wykorzystywaniu do rywalizacji zdanetyzowanej przestrzeni oraz technologicznej infrastruktury. Może to doprowadzić do nagłego przekroczenia punktu bifurkacji – powstania globalnego zagrożenia w wyniku wprowadzenia do struktur bezpieczeństwa technologii AI, które nie zostały sprawdzone w warunkach krytycznych. Może także dojść do gwałtownego załamania stabilności systemów i przejścia do samozorganizowanego stanu krytycznego świata.

SŁOWA KLUCZOWE:

sztuczna inteligencja, Stany Zjednoczone, Chińska Republika Ludowa, strategiczna dominacja, geopolityka AI, punkt bifurkacji

Bibliography

- Allison G., *Skazani na wojnę? Czy Ameryka i Chiny unikną pułapki Tukidydesa?*, Bielsko-Biała 2018.
- Bak P., Tang Ch., Wiesenfeld K., "Self-Organized Criticality: An Explanation of $1/f$ Noise," *Physical Review Letters*, Vol. 59 (4), 27.07. 1984, s. 381–384, on: https://pdfs.semanticscholar.org/5fdd/d5a5b4952032e4213f60595e9bf81d5532ed.pdf?_ga=2.26795381.971001938.1592004343-319393465.1592004343 (accessed on: 11 May 2020).
- Ball P., *Masa krytyczna. Jak jedno z drugiego wynika*, Kraków 2007.
- Barrow J.D., *Kres możliwości? Granice poznania i poznanie granic*, Opole 2005.
- Blount P.J., *Reprogramming the World. Cyberspace and the Geography of Global Order*, Bristol 2019.
- Bostrom N., *Superinteligencja. Drogi, niebezpieczeństwa, strategię*, Gliwice 2016.
- Brożek B., *Granice interpretacji*, Kraków 2018.
- Brynjolfsson E., McAfee A., *Drugi wiek maszyny. Praca, postęp i dobrobyt w czasach genialnych technologii*, Warszawa 2015.
- Brzeziński Z., *Wielka szachownica. Główne cele polityki amerykańskiej*, Warszawa 1998.
- Bulletin No. 22, January 2019 of the Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University.
- Bulletin No. 19, October 2018 of the Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University.
- Bulletin, Special Issue for the participants of the conference *Polish Analytical Community and Civilization Challenges in the Years 2020–2030*, 28 Nov 2019 – the Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University.
- Bush G., Scowcroft B., *Świat przekształcony*, Warszawa 2000.
- Cambell K.M., Ratner E., *The China Reckoning: How Beijing Defied American Expectations*, "Foreign Affairs", Vol. 97, No. 2, March/April 2018, pp. 60–70.
- Castells M., *End of Millenium*, Singapore 2010.
- Castells M., *The Power of Identity*, Singapore 2010.
- Castells M., *The Rise of The Network Society*, Singapore 2011.
- Cieślak E., *Chiny zaskakują sztuczną inteligencją*, Obserwatorfinansowy.pl, <https://www.obserwatorfinansowy.pl/bez-kategorii/rotator/chiny-zaskakuja-sztuczna-inteligencja/> (accessed on: 12 Jan 2019).
- Co wiadomo o „chińskiej DARPA”*, Bulletin No. 28, June/August 2019, Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University, Warszawa 2019, pp. 22–27.
- Czego pragną Drony?*, R. Nahirny, A. Kil, M. Zamorska (eds.), Gdańsk 2017.
- Christensen Th.J. *The China Challenge: Shaping the Choices of a Rising Power, New York–London 2015, Prologue*.
- Ding J., *Deciphering China's AI Dream*, on: https://www.fhi.ox.ac.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.pdf (accessed on: 14 Apr 2020).
- Ding J., *Deciphering China's AI Dream. The context, components, capabilities, and consequences of China's strategy to lead the world in AI*, on: https://www.FHI.OX.AC.uk/wp-content/uploads/Deciphering_Chinas_AI-Dream.PDF (accessed on: 12 Jan 2019).

Dutton T., *An Overview of National AI Strategies*, on: <https://medium.com/politics-ai/an-overview-of-national-ai-strategies-2a70ec6edfd> (accessed on: 12 Feb 2020).

Działalność Agencji Innowacji Obronnych – „francuskiej DARPA”, Bulletin No. 28, July/August 2019, Center of Studies on Civilization Challenges of the Security Research Center at the War Studies University, Warszawa 2019, pp. 28–35.

Fukushima K., *Neocognitron: A Self-organizing Neural Network Model for a Mechanism of Pattern Recognition Unaffected by Shift in Position*, “*Biological Cybernetics*”, No. 36, pp. 193–202 (1980), on: <https://www.rctn.org/bruno/public/papers/Fukushima1980.pdf> (accessed on: 12 Sep 2019).

Góralczyk B., *Wielki renesans. Chińska transformacja i jej konsekwencje*, Warszawa 2018.

Gen. Liu Guozhi, *Developing an intelligent military system is a strategic chance for our army to jump the gap* (刘治国中将: 军事智能化发展是我军弯道超车的战略机遇), CCTV News, 22 Oct 2017, on:

<http://mil.news.sina.com.cn/china/2017-10-22/doc-ifymzqpq3312566.shtml> (accessed on: 15 Mar 2020).

Global Trends. Paradox of Progress. National Intelligence Council, January 2017, p. 19, on: <https://www.dni.gov/files/documents/nic/GT-Full-Report.pdf> (accessed on: 23 May 2020).

Global trends 2035. Geo-politics and international power, European Parliamentary Research Service, September 2017, p. 31, on: [https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_STU\(2017\)603263](https://www.europarl.europa.eu/thinktank/en/document.html?reference=EPRS_STU(2017)603263) (accessed on: 16 Apr 2020).

Goodfellow I., Bengio Yo, Courville A, *Deep Learning*. Systemy uczące się, Warszawa 2018.

5G to my. An interview with Ryszard Hordyński, Director for strategy and communication in Huawei, by Patrycja Pendrakowska, Boym Institute, 12 Jul 2019, on: <https://instytutboyma.org/pl/wywiad-5g-to-my/> (accessed on: 23 Apr 2020).

Góralczyk B., *Wielki renesans. Chińska transformacja i jej konsekwencje*, Warszawa 2018.

Grochmalski P., *Autorytaryzm centroazjatycki a kwestia transformacji systemowej – próba poszukiwania modelu metodologicznego*, in: *Przywództwo, elity i transformacje w krajach WNP. Problemy metodologii badań*, T. Bodio (ed.), Vol. 1, Warszawa 2010, pp. 507–548.

Guth A.H., *Time Since the Beginning*, Cornell University, Astrophysics, 13 Jan 2003 (on-line), pp. 1-13, on: <https://arxiv.org/abs/astro-ph/0301199/>.

Ivorra B., Ferrández M.R., Vela-Pérez M., Ramos A.M., *Mathematical modeling of the spread of the coronavirus disease 2019 (COVID-19) taking into account the undetected infections. The case of China*, on:

https://www.researchgate.net/publication/340114074_Mathematical_modeling_of_the_spread_of_the_coronavirus_disease_2019_COVID-19_taking_into_account_the_undetected_infections_The_case_of_China (accessed on: 21 Mar 2020).

Kagan R., *Potęga i raj. Ameryka i Europa w nowym porządku świata*, Warszawa 2003.

Kamieński Ł., *Nowy wspaniały żołnierz. Rewolucja biotechnologiczna i wojna w XXI wieku*, Kraków 2014.

Keohane R., Joseph S. Nye J.S. Jr, *Power and Independence in the Information Age*, “*Foreign Affairs*” Sep/Oct 1998, pp. 81–94.

Kissinger H., *O Chinach*, Wołowiec 2014 [original title – *On China*, London 2012].

The Central Committee of the CCP and the State Council publish the *Outline of the National Innovation-Driven Development Strategy*, 中共中央国务院印发《国家创新驱动发展战略纲要》, *Xinhua*, 19 May 2016, on: http://news.xinhuanet.com/politics/2016-05/19/c_1118898033.htm (accessed on: 12 Feb 2020).

Koo J.R., Cook A.R., Minah P., Sun Y., Sun H., Tiao L.T., and oth., *Interventions to mitigate early spread of SARS-CoV-2 in Singapore: a modeling study*, on: [https://www.thelancet.com/journals/lancet/article/PIIS1473-3099\(20\)30162-6/full-text](https://www.thelancet.com/journals/lancet/article/PIIS1473-3099(20)30162-6/full-text) (accessed on: 23 May 2020).

Kosiński R.A., *Sztuczne sieci neuronowe. Dynamika nieliniowa i chaos*, Warszawa 2014.

Kurzweil R., *Jak stworzyć umysł. Sekrety ludzkich myśli ujawnione*, Białystok 2018.

- Kurzweil R., *Nadchodzi osobliwość. Kiedy człowiek przekroczy granice biologii*, Warszawa 2013.
- Latiff R.H., *Wojna przyszłości. W obliczu nowego globalnego pola bitwy*, Warszawa 2018.
- Lee K.-F., *AI Superpowers. China, Silicon Valley, And The New World Order*, Boston 2018.
- Mayer-Schönberger V., Cukier K., *BigData. Rewolucja, która zmieni nasze myślenie, pracę i życie*, Warszawa 2014.
- Metz C., *What The AI Behind AlphaGo Can Teach Us About Being Human*, Wired, 05.19.16, on: <https://www.wired.com/2016/05/google-alpha-go-ai/> (accessed on: 12 Aug 2019).
- Mialhe N., *Géopolitique de l'Intelligenceartificielle: le retour des empires?*, "Politique étrangère" 2018 (Automne), pp. 105-117, on: https://www.cairn.info/article.php?ID_ARTICLE=PE_183_0105 (accessed on: 14 May 2020).
- Miller M., *Internet Rzeczy. Jak inteligentne telewizory, samochody, domy i miasta zmieniają świat*, Warszawa 2016.
- Multidimensional Diplomacy of Contemporary China*, Simon Shen, Jean-Marc F. Blanchard (ed.), Lanhan-Boulder-New York-Toronto-Plymouth 2010.
- National Strategy For Artificial Intelligence*, NITRI Aayog, on: <https://niti.gov.in/sites/default/files/2019-01/NationalStrategy-for-AI-Discussion-Paper.pdf> (accessed on: 17 Mar 2020).
- National Security Forecast. Polish perspective*, B. Grenda, P. Grochmański, H. Świeboda, Warszawa 2018.
- Nixon R., *Asia After Vietnam*, "Foreign Affairs", Vol 46, No. 1, Oct. 1967, pp. 111-125.
- Pandya J., *The Geopolitics of Artificial Intelligence*, "Forbes", 28 Jan 2019, on: <https://www.forbes.com/sites/cognitive-world/2019/01/28/the-geopolitics-of-artificial-intelligence/#3959876d79e1> (accessed on: 16 Mar 2020).
- Prakash A., *Geopolitics of Artificial Intelligence*, Amazon Digital Services LLC – Kdp Print Us, 2017.
- Prakash A., *The Geopolitics of Artificial Intelligence. As the U.S. and China vie for global influence, AI will be central to the balance of power*, Scientific American, July 11, 2019, on: <https://blogs.scientificamerican.com/observations/the-geopolitics-of-artificial-intelligence/> (accessed on: 22 May 2020).
- Prakash A., *Growing Poland's Geopolitical Power Through Technology*, Wszystko Co Najważniejsze, on: <https://wszystkocoonajwazniejsze.pl/abishur-prakash-growing-polands-geopolitical-power-through-technology/> (accessed on: 15 Apr 2020).
- Prakash A., *Next Geopolitics; The Future of World Affairs (Technology)*, Volume One, 2016.
- Pillsbury M., *The Hundred-Year Marathon: China's Secret Strategy to Replace America as the Global Superpower*, New York 2016.
- Rosenbach E., Mansted L., *Geopolitics of Information*, Belfer Center for Science and International Affairs, Harvard Kennedy School, 28 May 2019.
- Scharre P., *Army of None: Autonomous Weapons and the Future of War*, New York, 2018.
- Scharre P., *Killer Apps. The real Dangers of an AI Arms Race*, "Foreign Affairs", May/June 2019, Volume 93, Number 3, pp. 135-144.
- Schneier B., *Data and Goliath: The Hidden Battles to Collect Your Data and Control Your World*, New York 2015.
- Sejnowski T.J., *Deep learning. Głęboka rewolucja. Kiedy sztuczna inteligencja spotka się z ludzką*, Warszawa 2019.
- Stanley-Lockman Z., *Why The Sky Is Not Falling: The diffusion Of Artificial Intelligence – Analysis*, Eurasia Review, November 30, 2019, on: <https://www.eurasiareview.com/26062019-why-the-sky-is-not-falling-the-diffusion-of-artificial-intelligence-analysis/> (accessed on: 11 May 2020).
- Serger S.S., Breidne M., *China's Fifteen Plan for Scienceand Technology*, "Asia Policy" No. 4, July 1, 2007, pp. 135-164, on: <https://www.nbr.org/publication/chinas-fifteen-year-plan-for-science-and-technology-an-assessment/> (accessed on: 27 Sep 2019).
- Spalding R., *Clash of Strategic Cultures*, March 5, on: <https://nsiteam.com/social/wp-content/uploads/2019/03/Spalding-IP-Clash-Final-5Mar19R.pdf> (accessed on: 12 Sep 2019) (accessed on: 18 Apr 2020).
- Spalding R., *Niewidzialna wojna. Jak Chiny w biały dzień przejęły wolny Zachód*, Warszawa 2019.

The Malicious Use of Artificial Intelligence: Forecasting, Prevention, and Mitigation, Brundage M., Shahar A. Clark J., Toner H., Eckersley P., Garfinkel B., Dafoe A, Scharre P., Zeitoff Th., Filar B., Anderson H., Roff H., Allen G.C., Steinhardt J., Carrick F., Ó-hÉigeartaigh, Beard S., Haydn B., Farquhar S., Lyle C., Crootof R., Evans O., Page M., Bryson J., Yampolskiy R., Amodei D., (February 2018), on: https://img1.wsimg.com/blobby/go/3d82daa4-97fe-4096-9c6b-376b92c619de/downloads/1c6q2kc4v_50335.pdf (accessed on: 16 Apr 2020).

Thomas M., *The future of artificial intelligence. 7 ways AI can change the world for better ... or worse*, BuiltIn June 8, 2019, on: <https://builtin.com/artificial-intelligence/artificial-intelligence-future> (accessed on: 12 Aug 2019).

Walsh T., *To żyje. Sztuczna inteligencja. Od logicznego fortepianu po zabójcze roboty*, Warszawa 2018.

Rodziński R., *Historia Chin*, Wrocław - Warszawa - Kraków - Gdańsk 1974.

Westad O.A., *The Sources of Chinese Conduct. Are Washington and Beijing Fighting a New Cold War?* "Foreign Affairs", Volume 98, No. 5 Sept/Oct, pp. 86-95;

Wójcik G.M., *Obliczenia pływne w modelowaniu mózgu*, in: *Neurocybernetyka teoretyczna*, R. Tadeusiewicz (ed.), Warszawa 2009, pp. 173-187.

Li Y., Wang B., Peng R., Zhou Ch., Zhan Y., Liu Zh., Jiang X., Zhao B., *Mathematical Modeling and Epidemic Prediction of COVID-19 and Its Significance to Epidemic Prevention and Control Measures*, on: <http://www.remedypublications.com/open-access/mathematical-modeling-and-epidemic-prediction-of-covid-19-and-its-significance-5755.pdf> (accessed on: 22 Jun 2020).

Article history: Received: 2.09.2020; Reviewed: 13.09.2020; Accepted: 8.10.2020

DOI: DOI: 10.5604/01.3001.0014.3837

Corresponding author: Piotr Grochmalski, PhD, War Studies University (ASzWoj), Warsaw, Poland; ORCID: 0000-0002-5671-3339; e-mail: p.grochmalski@akademia.mil.pl

Cite this article as: Grochmalski P., PhD, "American-Chinese War for Strategic Dominance in the Field of Artificial Intelligence and the New AI Geopolitics". *bellona quart.* 2020(2): 15-44

Policy: The content of the journal is circulated on the basis of the Open Access which means free and limitless access to scientific data.

Competing interests: The authors declare that they have no competing interests.

Table of content URL: <https://kwartalnikbellona.com/issue/12943>

Author`s bio: Piotr Grochmalski, PhD
Professor War Studies University, Head of Institute of Strategic Studies, geopolitician, analyst, forecaster.

Source of Research Funding: Publication financed within the project implemented in the Research Grant Program of the Polish Ministry of National Defense.
