The Implications of Sino-US Technological Competition: From the Text Analysis Perspective of EU National Think Tanks

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Abstract

By analyzing the data as well as views of EU think tanks on the Sino-U.S. technological competition, we can understand the EU's public opinion trend and strategic cognition in the Sino-U.S. competition and promote the healthy and stable development of China-EU relations. Taking 15 mainstream think tanks in Europe and 40 representative research reports as research samples, this paper compares various data, analyzes the main viewpoints of EU countries on the formation, characteristics and reasons of Sino-US technological competition, with the Data mining (DM), text analysis technique as well as literature analytic method. This study found that major think tanks of EU have reached a certain consensus on the motivation and impact of the competition, that is, the fundamental reason for the emergence of the competition is that the U.S. try to maintain its global and all-round hegemonic position, and this competition not only puts the EU in trouble, but also impacts the global order. As for the future strategy of the EU, the think tanks put forward three main plans, namely, building a technological roof of the world, de-risking and coordinating Sino-US-European relations, to enhance their strategic autonomy.

Keywords: EU think tank, think tank's viewpoint, Sino-US-EU relations, Sino-U.S. technological competition, science and technology policy, data mining technique.

1. Introduction

Innovation in science and technology has emerged as the primary arena for the large country game in the twenty-first century. China and the United States have been competing more and more in science and technology in recent years due to changes in American policies toward China. The European Union (EU) is becoming frequently involved in the scientific and technological competition between China and the United States due to its unique geostrategic position and strong scientific and technological capabilities. Based on the Data mining (DM) and text analysis technique, this paper will focus on the representative research reports of major think tanks in the EU, summarizing as well as analyzing their main views on the Sino-US science and technology game and the EU position, in order to judge the EU's economic, diplomatic, science and technology policies, and analyze China's countermeasures on this basis. For the reason that political elites from various countries have played an important leading and shaping role in the process of European cognition of China and the formation of public opinion and think tanks of EU countries have played an important role in the foreign policy-making of EU institutions and member states.

2. Sample Selection and Representative Research Results of EU National Think Tanks

2.1 Think tank sample selection

Data mining (DM) is the name given to a variety of computer-intensive techniques for discovering structure and for analyzing patterns in data. Using those patterns, DM can create predictive models, or classify things, or identify different groups or clusters of cases within data. [1] In this paper, 15 well-known think tanks in EU countries are taken as the analysis objects (see Table 1 and Table 2), after analyzing as well as summarizing, these data will be classified in to different groups, which contribute to collecting general EU viewpoints. The main reasons for choosing these think tanks are as follows: First, they are all top think tanks in EU countries. According to the "2020 Global Go to Think Tank Index Report" published by the University of Pennsylvania's "Think Tank Research Project" (TTCSP) and the "Global Think Tank Impact Evaluation Report 2021" jointly compiled by the Center for Information Resources Analysis and Applied Research of Zhejiang University, most of the selected think tanks rank among the top 100 in the world (see Table 1), which has an important impact on the policymaking of the EU and its affiliated countries. Second, the selected think tanks include both the think tanks of EU member states and the Brussels think tanks at the EU level. Among them, think tanks include official and private think tanks, covering representative think tanks of different types and values, making the research more comprehensive. Third, the selected think tanks are mainly from the core member states of the European Union, and their research reports have more influence on EU policies. Fourthly, the selected think tank contains a special study on the theme of this paper, "Sino-US Science and Technology Game." Fifth, this paper also includes the joint research of European think tanks, such as the report of the European Think-Tank Network on China, to provide a more comprehensive theoretical perspective so as to better judge the EU's consensus on the Sino-US science and technology game. All of these aspects contribute to Data mining operating, which is good for choosing appropriate think tanks viewpoints as samples.

Table 1 Overview of the top 100 global think tanks among the selected think tanks.

Think tank	TTCSP ranking	CIRAA ranking	Location
Bruegel	2		Brussels
Institut français des relations internationales	5	39	Paris
Centre for European Policy Studies	22	34	Brussels
Netherlands Institute of International Relations Clingendael	25		The Hague
Istituto per gli Studi di Politica Internazional	28		Milan
Elcano Royal Institute	29		Madrid
German Institute for International and Security Affairs	35	47	Berlin
Elcano Royal Institute	36		Barcelona
Istituto Affari Internazionali	48	87	Roma
German Council on Foreign Relations	62		Berlin
Norwegian Institute of International Affairs	65		Oslo
European Centre for International Political Economy	92		Brussels

2.2 Summary of representative research results

In this paper, the official websites of the selected think tanks are searched with keywords such as "Sino-US science and technology game" and "Sino-US-European science and technology relationship" in the official languages of EU member states. The time is set for January 2020 and after, and the articles published in 2023 are focused on (including 6 articles in 2020, 9 articles in 2021, 9 articles in 2022, and 16 articles in 2023). Through Data mining technique, these search criteria provide new analyzing patterns, separating different viewpoints into respective groups. After strict screening, 40 representative research documents were finally obtained (see Table 2), among which 5 reports were published by European think tanks.

After selecting these think tanks' viewpoints, this paper analyzes different texts, finding that the authors of the literature have the following three characteristics: First, most of them are senior researchers and professors who have long been concerned about the game between China and the United States; Second, most of the authors have served or are serving as senior consultants or important departments in EU institutions, which has great influence on the EU's foreign policy-making and scientific and technological strategy. Third, some authors are also media

writers, their research results have a large audience base. The characteristics of these authors make this study more practical.

Table 2 Representative research results, release dates and authors compiled by 15 think tanks in cooperation with think tanks.

Think tank	Representative research results and release date	Main author
Institut français des relations internationales	 Technology strategies In China and The United States, and the challenges for European companies [2020.10] Can Europe Do Without a Geologistical Strategy to Face China? [2023.06] The Technology Policies of Digital Middle Powers [2023.02] Digital Sovereignty: European Policies, American Dilemmas [2023.01] 	Laurence Nardon; Eric André Martin Marie Krpata Alice Pannier Mathilde Velliet
German Institute for International and Security Affairs	Strategic Rivalry between United States and China [2020.04] The Sino-American World Conflict [2023.05]	Annegret Bendiek; Barbara Lippert Peter Rudolf
Mercator Institute for China Studies	 Six priorities for "de-risking" EU relations with China [2023.04] Updating the EU action plan on China: De-risk, engage, coordinate [2023.06] Image control: How China struggles for discourse power China struggles for discourse power [2023.09] 	2. François Chimits; Francesca Ghiretti
German Council on Foreign Relations	 Europe's Capacity to Act in the Global Tech Race [2021.04] TTC Lift-off: The Euro-Atlantic Tech Alliance Takes Shape [2021.09] China "De-risking": A Long Way from Political Statements to Corporate Action)[2023.06] 	Suntram Wolff; Ole Spillner
Istituto per gli Studi di Politica Internazional	 USA-China. Technology, the clash gets tough [2022.10] Cooperation and Integration: Why Vilnius is also about EU [2023.07] 	Filippo Fasulo; Davide Tentori Sophia Besch
Istituto Affari Internazionali	1. Broadening the Transatlantic Partnership to Address the China Challenge [2020.12] 2. Technological Competition: Can the EU Compete with China? [2021.04]	Carisa Nietsche
Bruegel	1. Lessons for Europe from China's quest for semiconductor self-reliance [2022.12] 2. China and the US might not be decoupling but their technologies are bifurcating [2023.05]	Alicia García Herrero Alicia García Herrero
Centre for European Policy Studies	The EU's aim to de-risk itself from China is risky yet necessary [2023.09]	Malorie Schaus; Karel Lannoo
European Centre for International Political Economy	2. What is Wrong with Europe's Shattered Single Market? [2023.04]	Hosuk Lee-Makiyama Matthias Bauer
Wilfried Martens Centre for European Studies	 The EU-US Trade & Technology Council: Red Light & Green Light [2021.12] The technology challenge in the transatlantic relationship [2021.11] European sovereignty between autonomy and dependence: A guide for EU policy [2023.06] 	2. Raluca Csernatoni
Elcano Royal Institute	The EU and Japan: forging joint opportunities for global technology governance beyond great power rivalry [2022.03] The US-China technology war and its effects on Europe [2023.02] European strategic autonomy and defence after Ukraine [2022.11]	1. Raquel Jorge Ricart 2. Enrique Feás 3. Luis Simón
Barcelona Centre for International Affairs	 Europe, the third way of technological transformation [2021.11] How can the European Union achieve digital strategic autonomy? Views from future leaders [2022.12] 	Carme Colomina Inés Arco Escriche
Netherlands Institute of International Relations Clingendael	Why the EU should pay more attention to Taiwan [2020.01] China's Digital Power, Assessing the Implications for the EU [2022.01] How strategic tech cooperation can reinvigorate relations between the EU and India [2023.01] Towards an EU–ASEAN digital partnership? [2022.02]	2. Frans-Paul van der Putten;Maaike
Utrikespolitiska Institutet	What to Make of the Huawei Debate? 5G Network Security and Technology Dependency in Europe [2020.01]	Tim Rühlig; Daniel Voelsen
Norwegian Institute of International Affairs	Chinese digi-tech politics [2021.11]	Hans Jørgen Gåsemyr
European think tank Joint research	Europe in the Face of US-China Rivalry [2020.01] Decoupling-Several Ties and Patchwork Globalisation [2021.01] THE SHAPE OF THINGS TO COME: The Race to Control Technical Standardisation [2021.12] Dependence in Europe's Relations with China: Weighing Perceptions and Reality [2022.04] From a China strategy to no strategy at all: Exploring the diversity of European approaches [2023.07]	Mikko Huotari; Jacob Gunter Tim Rühlig John Seaman; Miguel Otero Iglesias Pombord Portsch, Lucas Felbrahar

3. The Main Cognition of EU National Think Tanks on the Sino-US Science and Technology Game

3.1 The main cognition of the motivation of Sino-US science and technology game

On the motivation of the Sino-US science and technology game, EU think tanks have basically reached a consensus that the fundamental reason for the emergence of the Sino-US science and technology game is that the United States maintains its global and all-round hegemonic position, which is embodied in technology, economy, security, and value.

From a technical perspective, the competition between China and the United States in science and technology is a contest for supremacy in the digital era. Pierre Girard has highlighted that the initiative "Made in China 2025", which aims to secure China's future dominance in global technology, is perceived by the United States as a significant threat to its own technological supremacy. [1]. Enrique Feás posits that the American struggle against China's advancements in science and technology encompasses two primary fronts. Firstly, the objective is to prevent China from closing the gap with the United States in technological supremacy, which carries significant economic and military ramifications. This is pursued through measures to obstruct technology transfer. Secondly, efforts are directed towards augmenting the technological disparity between the two nations by subsidizing domestic production [3].

From an Economic perspective, China and the United States' science and technology competition is really a contest over economic laws, particularly those pertaining to patents, investment, innovation, intellectual property rights, and standard-setting. Besides, Volker Perthes observed that bilateral trade between the United States and China can no longer be regarded as a stabilizing force capable of alleviating political conflicts. Instead, trade disputes have increasingly become politically instrumentalized. Nonetheless, these trade conflicts may also represent some of the most manageable issues within the intricate dynamics of US-China rivalry [4].

From a security perspective, a lot of academics think that China's dual-use technology is a worry because of American efforts to control China's scientific and technical advancements. Mathilde Velliet and John Seaman point out that what worries the Americans is the "multiplier effect" of cutting-edge technologies—advanced semiconductors, supercomputers, quantum, artificial intelligence, etc. — and the Chinese strategy of civil-military fusion. For Washington, China's pursuit of a dominant position in these key economic sectors can no longer be dissociated from the strategic and military threats posed by Beijing. The American objective is to stem Chinese technological progress in all key sectors [5].

From a value perspective, the technology competition between China and the US is underpinned by a disagreement about systems, ideology, and global power between the two nations. Peter Rudolf observed that it is likely the United States will increasingly promote its narrative of a systemic conflict between "digital authoritarianism" and "liberal democracy". This narrative serves to galvanize sustained domestic political support for an extended and costly confrontational policy toward China [6]. Volker Perthes has also highlighted that "technopolitical spheres of influence", which are established through digital products and services, have transcended purely territorial boundaries. Nevertheless, these spheres continue to enable the projection of geopolitical power and the reinforcement of international dependencies. In this context, the development and utilization of technologies increasingly intersect with political and ideological considerations, becoming integral to systemic opposition or competition regarding internal political orders [4].

3.2 The main cognition of the harm of the Sino-US science and technology game

There are two ways to sum up the harm that EU think tanks do to the Sino-US science and technology game: the globe and the EU.

First, national think tanks in the EU feel that the Sino-US competition in science and technology would have detrimental consequences, including a strategic quandary, economic harm, and diminished global influence inside the EU [7]. Ole Spillner and Guntram Wolff have noted that the political economy challenge is both more significant and more complex to address through public policy. Firms may find themselves ensured in

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international confrontations even in the absence of direct EU-China conflicts. For instance, the United States might pressure EU firms to curtail their activities in China or even to adopt a "China-free" stance [8]. The EU will be strategically exposed as a result of its reliance on technology and the economy at the same time as China and the US intensify their scientific and technical rivalry. Jeremy Shapiro said that there is a growing sense of a neocolonial dependence on US internet companies, the reliance on the US, at least to date, far exceeds European digital dependence on China, which might influence European digital sovereignty deeply [9]. Kaan and Tyson pointed out that the majority of stakeholders surveyed say that the EU relies most on the US for key technologies including artificial intelligence (80 percent) and cloud computing (93 percent) but also blockchain, high performance computing, and the internet of things (IoT) [10]. Meanwhile, Marie pointed out that European dependence on China will be explored through six perspectives on vulnerability at the EU level: import-related vulnerabilities, supply-chain-related vulnerabilities, market-access-related vulnerabilities, competitiveness-related vulnerabilities, security-related vulnerabilities relating to China's geopolitical aspirations [11].

Second, the international system and the basis of multilateralism have been severely harmed by the Sino-US science and technology game, which has also delivered a severe blow to the global economy, science and technology, and market order. It is reflected in five respects: (1) It is clear that China and the US have accelerated a dangerous subsidy race with unpredictable consequences [4]; (2) The United States and China appear to be diverging into two distinct technological ecosystems, primarily concerning a few key technologies. However, once the process of forming alliances begins, it becomes increasingly difficult to reverse this trend [12]; (3) Should the strategic rivalry between the United States and China solidify into a sustained global conflict constellation, it could initiate a form of deglobalization. If the US-China conflict intensifies and accelerates the bipolarization of the international system, it may erode the foundation for global multilateralism [4]; (4) Standardization is turning becoming a weapon in international competition, and the division of American and Chinese standards could cause the global standardization system to become distorted or perhaps break apart; (5) High-tech commercial flows are increasingly being subject to securitization. This trend is characterized not only by the imposition of direct market access barriers, such as negative lists and national security measures, but also by the introduction of indirect barriers, including national standards and licensing requirements [13].

3.3 Main suggestions for the future development of the EU

By combing the comments of EU national think tanks on the EU's scientific and technological game between China and the United States, we can clearly find that its core proposal is that the EU should strengthen its strategic autonomy, and the specific contents are as follows

3.3.1 It must improve its military and technological prowess and establish itself as the world's roof

First of all, the EU should gradually restore its influence on the world by opening up the "third way" besides Sino-US technology and competing for the leading position in the field of digital standard setting. Alice Pannier has noted that while the EU maintains a significant market share in specific technological sectors such as 5G equipment and semiconductors, it is more prominently recognized as a normative power. The EU leverages the size of its market to influence global standards and regulations, both in goods and digital services. Currently, the EU aims to establish itself alongside the United States and China within the emerging multipolar international system and to adopt a more strategic and comprehensive approach in its partnerships [14]. At the same time, some scholars suggest that the EU should actively draw international partners such as Canada, Japan, South Korea, Australia, and South Korea, as well as emerging countries such as India and Vietnam, to participate in its "third way" construction.

Second, in order to advance the "people-oriented" international technological order under the aegis of human rights, values, and shared interests, it is imperative that the EU accelerate its process of digital integration, improve policy coordination among its member states, and encourage the development of digital interest communities among them. Tim Rühlig and Maja Björk suggested that maintaining access to strategic technologies, such as 5G, through the diversification of supply chains and the management of underlying patents could serve as a strategic response to the burgeoning international rivalry in high technology. This approach aims to balance the

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preservation of free trade with the need to navigate the complexities of emerging technological conflicts [15]. However, Inés Arco Escriche pointed out that the primary challenge lies in the internal disparities among EU member states and the absence of a genuine political union. Addressing these internal digital divides and asymmetric frameworks will be crucial for enhancing the EU's role, despite its inherent weaknesses [16].

3.3.2 The EU must lessen its strategic reliance on China and the US and strengthen its risk reduction policy

Prioritize changing the conversation in the EU on China from "decoupling" to "risk removal," adopt a flexible foreign policy, and raise awareness inside the EU of its own vulnerabilities. The majority of think tanks place emphasis on the supply of essential raw materials, the enhancement of the market system, the defense of European businesses' foreign interests, and the digital and green transformation as the main areas of risk reduction in the EU. Ole Spillner Prof and Guntram Wolff proposed a European Economic Security Committee that is tasked with defining security risks and providing a clear roadmap as to how to address them [8]. The think tank also stated that the EU need to aggressively pursue international markets, particularly by forging free trade and diplomatic pacts with the Western Balkans, Africa, and Asean.

The second way is to "de-risk" in order to harmonize US and EU stances on China and encourage coherence between the organization's internal and exterior policies. For how to de-risk, Malorie Schaus and Karel Lannoo have identified three key strategies for moving forward. First, the European Union must advance towards a more integrated and cohesive industrial policy to effectively facilitate the green and digital transitions. Second, the EU requires a comprehensive strategy for de-risking and diversification, which demands extensive consultation and coordination between EU institutions and businesses. This approach should aim to delineate clear strategies for risk mitigation and to ensure predictability and stability within supply chains. Third, it is imperative for the EU to establish formal procedures for managing visits to and public statements about its "systemic rival" [17]. Mikko Huotari and Grzegorz Stec advocate for a coordinated yet autonomous European strategy in its high-tech relations with China. They emphasize the importance of managing the strategic divergence between the EU's interests and values and those of China. Additionally, they highlight the necessity for proactive measures to mitigate strategic vulnerabilities, particularly concerning critical raw materials [18].

3.3.3 The national think tanks of the EU have developed three perspectives about the EU's role in communication with China and the US: pragmatic development, interest coordination, and value orientation

Value oriented. According to some academics, the EU should be led by values, concentrate on collaborating in science and technology with "like-minded" nations like the US, and work together to address the changes in global order brought about by China's advances in these domains. John Seaman has noted that, despite concerns over overreliance on American technology and power, dependencies on the United States do not evoke the same level of alarm as those associated with China. A fundamental factor contributing to this discrepancy is the shared "like-mindedness" in political values and the binding nature of a military alliance [19]. Tyson has argued that the European Union and the United States represent the two principal democratic technology blocs. Due to their shared values, robust innovation ecosystems, substantial market sizes, and significant regulatory influence, they have the potential to form a 'hidden G2' for democratic technology governance [20]. Furthermore, Carisa mentioned that a pre-condition for success will be expanding beyond the transatlantic allies to engage like-minded democracies, especially in the Indo-Pacific [21].

Pragmatic and developmental. Some scholars believe that the EU should look at Sino-US-European relations from a more pragmatic perspective, safeguard its own scientific and technological interests, strengthen cooperation with China in economic and international governance, and effectively promote the consensus of "defense independence." In Euro-China relations, Katja et al. pointed out that the US appears to be single-mindedly pursuing its key interests—standing up to China and shoring up its domestic economy—while completely disregarding those of the EU [22]. In the game of science and technology, some scholars pointed out that the EU's vulnerability due to its dependence on China and the United States is gradually increasing with technological changes and intensified competition [23]. Alicia García-Herrero pointed out that European policymakers present a different narrative, emphasizing the reduction of strategic dependence rather than obstructing China's access to core technologies. This approach might be interpreted as indicating that the EU is not fully aligned with the US

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in its efforts to technologically contain China [12]. In Euro-American relations, Federico pointed that the US appears to be single-mindedly pursuing its key interests—standing up to China and shoring up its domestic economy—while completely disregarding those of the EU [24]. At the same time, Luis Simón has observed that the increasing emphasis of the United States on China and Asia is compelling Europe to take on greater responsibility for its own security and defense. This shift occurs in the context of a notable deterioration in European security, thereby highlighting the urgent need to enhance European autonomy in security and defense matters [25].

Interest coordination. Some scholars believe that the EU should act as a "coordinator" and a "middleman" between China and the United States and work together with China and the United States on global issues such as governance and international peace. For the impact of current global risks such as climate change and the proliferation of weapons of mass destruction, Hanns W. Maull has argued that cooperation with China is essential for addressing a range of global challenges, including climate protection, pandemic control, and disarmament. Effective mitigation of these risks requires extensive international collaboration, in which cooperation between the United States and China, while necessary, is not sufficient on its own. Meanwhile, the concept of 'peaceful coexistence'—conceived as a competition among differing systems without descending into warfare—could serve as a foundational framework for shaping the foreign policy strategies of both the United States and China, with the aim of minimizing the risks of confrontation [26].

4. An Examination of the Traits and Rationale Behind National Think Tanks Inside the European Union

4.1 The primary features of the EU think tank perspective

The aforementioned illustrates how the think tanks of EU member states participate in the "Sino-US science and technology game," mostly expressing their opinions along the following three lines: First, the think tanks in the Sino-US science and technology game want to preserve their worldwide influence and reach the technical roof of the globe because they recognize the strategic vulnerability brought about by the EU's technological gap. The necessity for the EU to improve its technical standards and foreign policy coherence is stressed above all. Secondly, there were disparities among EU think tanks about the path towards strategic autonomy and the trajectory of technical advancement. However, it will also make China-EU contacts safer, and many tend to believe that China would use its asymmetric advantages to force Europe. On the one hand, it is hoped that Europe will attach significance to its connections with China's economic and global governance partners. Third, lacking sufficient knowledge on the trajectory of China's scientific and technical advancements as well as the significance of China-EU ties going forward, some think tanks have expressed concerns about China's "growing self-confidence," called China's growth path "ambitious" in terms of achieving global hegemony, and seen China's emergence as a danger to the EU's development goals and influence abroad. According to many think tanks, the EU should reassess its China strategy since it is encountering increasing costs and uncertainty in its dealings with China. The proposal's overall unfavorable characteristics pertaining to China have also grown.

4.2 An examination of the factors influencing think tanks' perspectives

4.2.1 Aim to optimize the EU's interests

The EU has a long-standing military and technological reliance on the United States. In addition, the EU fosters its own scientific and technological advancement through technical contacts between China and Europe and requires the stability of the Chinese market and its own supply chain. Therefore, the EU does its best to avoid "choosing a side station" in the scientific and technical competition between China and the United States. In addition, the EU actively develops a "Global Gateway" plan, vigorously promotes a "people-oriented" digital road, and creates a "third way" with the assistance of third-party consensus regarding the Sino-US science and technology game. The EU also uses human rights, democracy, and other concepts to better implement protectionism, protect the growth of domestic science and technology enterprises, pursue the benefits of technology for sovereignty and the economy, and shape a digital development that is characteristic of the EU.

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4.2.2 Misunderstanding of how science and technology have advanced in China

The EU-China relationship went through a protracted honeymoon phase. With the rise in Sino-US tensions and the effects of the COVID-19 pandemic, the EU's perception of China has progressively changed over the past few years, moving from "partner" to "institutional adversary" or even "systematic adversary." Because of this calculated miscalculation, the EU's perception of China's scientific and technical advancements has worsened, and the EU national think tank report has been mentioning China as a "security threat" frequently. Furthermore, there are ideological disparities between China and Europe, particularly with regard to values like "freedom" and "democracy," which renders the two irreconcilable. As a result, the conflict over values has frequently come up in writings published by national think tanks inside the European Union.

4.2.3 The ancient western center's hues

Whether we agree with it or not, Europeans indeed have had a significant influence on the laws, regulations, and technological advancements of the contemporary world. Europe has long had a "condescending" attitude toward the growth of other nations due to this self-awareness. Europe is currently resisting China's rise in certain ways. Europe saw the United States with the same mindset one hundred years ago as it does now. In the Sino-US science and technology competition, European strategic autonomy and "de-risk" are not just for China, but also for the US. It's evident from his statements that French President Emmanuel Macron does not want Europe to be a "spectator." It is tough for Europeans to accept themselves as observers or to emulate the predominant hue of the past. The complex connection among China, the US, and Europe has another significant factor to do with this.

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