Technology-Society Interaction and the Development of Contemporary New Media Technologies: The Case of 5G and Artificial Intelligence (Postprint)

Authors: Li Yingzhang

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Abstract

In the contemporary era, information technology is advancing rapidly, and the boundaries and influence of new media technology continue to expand. Regarding the relationship between new media technology and society, both technological determinism and social determinism are unidirectional and one-sided; instead, it should be examined through a dynamic perspective of technology-society interaction theory. This article proceeds from the evolution of three theoretical perspectives, taking 5G and artificial intelligence in current new media technology as examples, and situates them within specific stages of technology-society interaction to explore the manifestations of their interaction.

Full Text

Preamble

Examining Current New Media Technology Development from the Technology-Society Interaction Perspective: Cases of 5G and AI Technologies

(School of Journalism and Communication, Shandong University, Jinan, Shandong 250100)

Abstract: In today' s era, information technology is advancing with each passing day, and the boundaries and influence of new media technology continue to expand. Regarding the relationship between new media technology and society, both technological determinism and social determinism offer one-sided perspectives; instead, a dynamic view from technology-society interaction theory should be adopted. This paper begins with the evolution of three theoretical

perspectives, using 5G and artificial intelligence as examples of current new media technologies, and places them within specific stages of technology-society interaction to explore the manifestations of this interaction.

Keywords: Technology-Society Interaction Theory; New Media Technology; 5G; Artificial Intelligence; Media Circle

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1. Theoretical Evolution

The relationship between technology and society has been conceptualized through three main theoretical frameworks. Technological determinism, proposed by Harold Innis, suggests that media technology development largely determines social development and transformation, viewing technology as a force beyond human control that invariably exhibits temporal or spatial biases. Marshall McLuhan further developed this perspective with his famous concept "the medium is the message," arguing that media redefine time and space and transform human thinking and behavior patterns. McLuhan subsequently proposed his "theory of media epochs," dividing human social development into stages based on media evolution. These perspectives collectively illustrate media' s shaping role on society from different angles. However, this unidirectional view from technology to society contains flaws, leading some scholars to propose a more moderate weak technological determinism, which argues that technology plays a decisive role only under the constraints of various social factors [1]. Both strong and weak forms of technological determinism emphasize technology' s core role in promoting social development.

In opposition, social determinism contends that technology is controlled by society, with economic, political, and cultural forces determining a technology' s development and adoption. British scholar Brian Winston proposed the "accelerator-brake" model, wherein the accelerator represents social needs that drive invention diffusion, while the brake represents the combined restrictive force of social constraints, making the birth and dissemination of new technologies subject to profound and complex social causes. From this perspective, technology must adapt to existing social structures.

Neither technological determinism nor social determinism alone can fully explain the technology-society relationship. Consequently, many scholars have adopted a compromise view: technology, culture, and humans are interconnected and mutually reinforcing, forming a co-evolutionary relationship [2]. This interac-

tion can be divided into three stages in the vertical development of a specific technology. First, in the birth phase, social factors influence technology more than vice versa; needs generate new inventions, and since technology remains experimental, its social impact is not yet apparent. Second, in the maturity phase, technology becomes dominant after diffusion. Finally, in the obsolescence phase, social forces again exceed technological forces, compelling outdated technology to make gradual improvements under social checks and balances. New social needs then promote the emergence of new technologies, initiating a new cycle.

2. Literature Review

Contemporary research on new media technology development and its societal interaction reveals several key themes. Some scholars, guided by technological logic, note that current technology exhibits characteristics of integration with the human body. Sun Wei argues that media convergence should be understood as the reorganization of human senses and reconstruction of perception, which in turn connects to human social networks [4]. Lu Weilin and Gong Chengbo contend that algorithmic technology constructs an intelligent communication environment, bridging individual cognition of intelligent machines with human social cognition [5]. Regarding the necessity of social regulation in intelligent media technology development, Zhou Yong argues that "intelligent plagiarism" seriously damages the copyright protection ecosystem, necessitating new process regulations that fully consider how AI extends human creative capabilities [6]. Other scholars approach the issue through "social media" research; for instance, Lin Aijun and Zhang Bo argue that the rise and popularity of internet memes result from the joint action of media technology and cultural logic [7]. This paper recognizes that technology and society exhibit an overall interactive relationship, using 5G and artificial intelligence as examples to substantiate the characteristics and trends of specific stages in technology-society interaction.

3. 5G Technology: The Birth Phase of Interaction with Society

The year 2019 was hailed as the "first year of 5G," when China' s Ministry of Industry and Information Technology officially issued 5G commercial licenses to China Telecom, China Mobile, China Unicom, and China Broadcasting Network. As a new generation of wireless communication technology, 5G currently remains in its birth phase, demonstrating the driving force of social factors.

On one hand, developed countries have long monopolized global commercial technology standards. From 2G to 3G, China' s communication technology was at a disadvantage, lacking core technology and constrained by patents. As a national foundational industry, 5G represents a strategic high ground that all nations are competing to seize, with the United States and South Korea particularly intensifying their competition for 5G leadership. To enhance discourse power in 5G technology standards and break this monopoly, China launched

relevant 5G research in 2015, incorporating it into the Made in China 2025 strategic framework. Currently, China has led some 5G technology standards and become a master of 5G core technologies [8].

On the other hand, with mobile internet development, more devices are connecting to mobile networks, generating new services and applications. Social demand for mobile data is experiencing explosive growth, particularly among digital natives who naturally embrace new communication technologies and possess high digital literacy and the ability to process multiple information streams. Current mobile communication network capacity can hardly satisfy the enormous traffic generated by increasing mobile users, and the ability to perform personalized intelligent optimization appears insufficient. The characteristics of 5G technology—ultra-high transmission rates, massive bandwidth, high reliability, and low latency—well adapt to contemporary demands, and deep integration with new media brings more imaginative space to the media industry [9].

In the birth phase of technology-society interaction, this paper identifies an additional trend: the mutual combination of new technologies gradually develops technological forces from implicit to explicit, transitioning toward the maturity phase. 5G technology continuously exerts force together with IoT, VR/AR, and other emerging technologies. Relying on the 5G platform, information dissemination will expand from human-to-human to human-to-everything. All things can achieve interconnectivity, and the news production field will realize intelligent information collection, truly becoming intelligent media. VR/AR technology will be commercialized on a large scale, bringing users better immersive experiences.

4. Artificial Intelligence Technology: The Mature Phase of Interaction with Society

Artificial intelligence originated at the Dartmouth Conference in the United States in 1956 and has a history of more than 60 years. Since the late 1980s, it has entered a rapid development stage. Currently, AI technology has entered its mature phase and is becoming a decisive force propelling humanity into the intelligent era.

In the maturity phase of technology-society interaction, society' s influence on technology still exists but mainly manifests as an active reactive effect, socially regulating technology' s radical potential. Current AI development faces several problems. During data collection and processing, subtle fraudulent behaviors that are not easily detected can lead to data distortion, interfering with news authenticity and objectivity. When collecting users' personal information, AI systems are also prone to leaking privacy and enabling cybercrime. Therefore, it is necessary to effectively domesticate and correct technological ethics through establishing laws and regulations, "constraining data rights," and strengthening quality control at all data stages. Additionally, AI adoption has caused industry changes that make many people worry about their own uselessness and that

"machines will replace humans." Society needs to strengthen AI ethics construction, conduct human-machine value judgments, deepen human subjectivity at the ideological level, and guide technological development with value concepts.

At the macro level, technology development leads to changes in social-historical structures. AI' s comprehensive penetration into new media is reshaping the journalism ecology. AI can enhance news production efficiency. For example, Xinhua News Agency launched the robot reporter "Kuai Bi Xiao Xin" in November 2015, which can batch-generate articles in a short time relying on big data processing and algorithmic models, improving collection and writing efficiency. In collaboration with AI technology, subtitle generation robots, conference reporting robots, and data journalism robots have also emerged [10]. In November 2018, Xinhua News Agency developed China' s first high-simulation male AI anchor, which began working. In 2019, an AI-synthesized female anchor appeared in Two Sessions reporting. The "Media Brain" system, jointly built by Xinhua News Agency and Alibaba, integrates AI, big data, and other technologies to help various media achieve full-process intelligent news reporting from clue discovery to material collection, editing production, and distribution, launching a revolution in wisdom. Therefore, AI technology is promoting the digital era toward the intelligent media era, bringing entirely new productive forces to content production, potentially shifting from previous PGC and UGC models to MGC (Machine-Generated Content).

At the micro level, technology-society interaction manifests as technology being a primary cause of changes in social psychology and human thinking patterns. AI-powered intelligent robots will "prompt the evolution of media technology form from 'media as extensions of man' to 'media as man.' " Media becomes a human with subjective agency, extending humans at both sensory and rational levels to an exquisite degree, mobilizing richer human bodily organs during human-computer interaction. Examples such as Siri, Microsoft Xiaoice, and Xiaodu, intelligent chatbots, can not only communicate with users via voice but also provide personalized emotional companionship, making human-computer interaction more present. As Innis stated, "The strength of a new medium will lead to the emergence of a new civilization." Some scholars predict that future human-machine civilization may replace human civilization, heralding the arrival of the "sixth media" era.

At the individual level, French scholar Régis Debray proposed the "media circle" theory. The "media circle" reflects the interaction between technological factors and cultural values. Debray considers synergy and immersion as the main structural characteristics of the media circle. He argues that "technological changes cause changes in the social status and meaning of relevant practitioners in the power game, leading to shifts in power that interact with the macro-environment at the socio-political level, resulting in 'media revolutions' "[11]. The widespread application of AI technology in the new media field is, on one hand, creating new professions and placing new demands on media practitioners' AI literacy, while also causing some people to panic about their own competence. On the

other hand, machines' replacement role in some news work has a relatively large impact on editors and reporters. Simultaneously, journalists and editors are freed up to invest more time and energy into deeper news creation, promoting talent structure optimization and thereby changing social structures.

Technology and society should be viewed as an organic whole from an ecological perspective. The current development of new media technology fully embodies the interaction between technology and society. Only by correctly handling the relationship between the two can new media technology continue to contribute to social progress and the development of human civilization.

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Note: Figure translations are in progress. See original paper for figures.