Connecting Milestones Through Historical Narratives: The Continuous Journey of Media Technology Development (Postprint)

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Abstract

ChinaXiv Cooperative Journal: Linking Monuments Through Historical Narrative, Media Technology Development Is an Endless Journey By Zhu Youqin

Full Text

Preamble

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1.1 On the Segmentation of Human Communication Development History

McLuhan believed that communication media have experienced three eras: "oral communication," "written communication," and "electric communication." Canadian physicist and communication scholar Robert Logan, in his book *Understanding New Media: Extending McLuhan*, refined and supplemented this view by dividing the development of human communication media into five eras: "non-linguistic analog communication era," "oral communication era," "written communication era," "mass electric communication era," and "interactive digital media or new media era." Some domestic scholars have also proposed a five-stage division: oral media, written media, print media, electronic media, and digital media.

Based on our practical insights, we merge the prehistoric periods of body language communication, oral communication, and non-linguistic communication using external objects into a "prehistoric communication stage," characterized by the use of human organs as the primary communication tools. Furthermore,

we divide the digital communication stage into two distinct phases—digital communication and network communication—because although both employ digital symbol systems, their symbol replication mechanisms differ, much like how written communication and print communication share the same written symbol system but utilize different replication mechanisms. Consequently, we categorize the development history of human communication into six stages: "prehistoric communication," "written communication," "print communication," "electromagnetic communication," "digital communication," and "network communication."

1.2 Symbols, Media, and Channels as the Three Constitutive Elements of Communication Media

A necessary prerequisite for human communication is the organization and processing of content and meaning. Human thought is hidden and imperceptible—others cannot see, hear, or touch it. To convey ideas and information from one's mind to others, one must seek external markers; these are symbols. Symbols are marks used to express and record specific meanings, information, or knowledge. In addition to symbols, human communication requires material carriers to bear and transmit these symbols, which we call media. For example, transmitting language requires vibrating air, transmitting written text requires paper for writing, transmitting electronic symbols requires electric waves, and transmitting digital symbols requires networks. Therefore, people typically consider communication media as comprising information symbols and transmission media.

In our book *A Historical Narrative of Science and Technology Development in China's News Media*, we supplement this view by proposing that human communication involves another crucial element: the "channel." A channel refers to the connection points between sender and receiver in the communication process, or the pathways through which information flows and diffuses. Medium generally refers to static material carriers, such as the paper medium of newspapers, whereas channel refers to dynamic connection pathways—for instance, the postal distribution network that delivers newspapers constitutes the channel connecting newspaper offices to readers. Incorporating "channel" as one of the three constitutive elements of communication media better reveals the essence of media and effectively explains phenomena such as "whoever controls the communication channel owns the users."

1.3 Symbols as the Genes of Media: Media Development Conforms to Evolutionary Laws

Without symbols, there would be no media, for without symbols, media could not become information, nor could they become extensions of our senses. We posit that the "genes" of media are information symbols, that human communication is the process of media replicating symbols, and that "mutation" in

information symbols is the source of media evolution and iteration. Therefore, the evolution and iteration of communication media result not only from the continuous development of human science, technology, and social needs but also from the progressive symbolization of human thought and the continuous strengthening of symbol systems—this is the logic underlying media evolution.

Accordingly, *A Historical Narrative of Science and Technology Development in China's News Media* classifies seven types of communication media—body language media, oral media, written media, print media, electromagnetic media, digital media, and network media—into two categories. The first category includes body language media, oral media, written media, electromagnetic media, and digital media, all arising from "genetic" mutations in media (i.e., changes in information symbol systems). The second category comprises print media and network media, both resulting from improvements in media's "genetic replication mechanisms" (i.e., improvements in symbol replication methods).

Media form "iterative evolution" triggered by mutation in "media genes" (information symbol systems) or improvement in "genetic replication mechanisms" (symbol replication methods) exhibits time-dimensional "upgrading and replacement" characteristics. In contrast, media form "diverse evolution" resulting from "genetic recombination" through the fusion of two media or "transgenic" changes from introducing exogenous "genes" into a medium demonstrates space-dimensional "variety expansion" characteristics. Thus, from spatiotemporal dimensions, media development progresses from simple to complex, from low-level to high-level, and from singular to diverse. This represents one of this book's innovations: proposing to examine and explore media evolutionary history through evolutionary thinking and research methods.

Albert Mehrabian, a psychology professor at the University of California, defined "inconsistent communications" in his 1971 book *Silent Messages* as situations where "what our language seeks to express is inconsistent with what facial expressions, postures, tone, or gestures convey." He questioned whether a systematic and consistent method could resolve the general meaning or impact of inconsistent messages. His research demonstrated that overall feeling toward information = 7% verbal feeling + 38% vocal feeling + 55% facial feeling, known as the famous 73855 communication law, which posits that facial expression has the greatest impact, followed by vocal tone, with written text having the least influence. Therefore, in our "global village," although current audio-visual multimedia communication has achieved relatively high levels, black technologies such as VR/AR, 5G+4K/8K+AI high-definition displays, and immersive 3D surround scene design that create lifelike experiences and reduce attenuation remain far from sufficient. Human demands for communication quality continue to escalate, and the challenge of using the internet to construct seamless, imperceptible two-way communication environments has entered uncharted territory, full of challenges. Indeed, the progress of media technology knows no bounds.

2.1 Technology as the Source Power of Media Development

The mutation and replication of media "genes" both require energy. Throughout the history of media development, every step forward involves the dual interaction of demand and carriers—demand pulls while technology drives, forming the necessary and sufficient conditions for media progress. The three nodal communication revolutions in human social history have all emerged under the impetus of corresponding industrial revolutions. Humans not only create technology but are also shaped by it; technology redefines our behavioral patterns in unpredictable ways and endows capital and political domination with greater power. Particularly since the 20th century, as technological influence has become increasingly extensive and profound, media development and transformation have accelerated. Although we are not "technological determinists," media development cannot be separated from technological support—media are applications of technology, not merely optional or scalable catalysts. Historical facts have proven: whoever first masters advanced science and technology and applies it to news media becomes the new media and may seize the commanding heights of public opinion.

2.2 The Boundless Frontier of Media Technology Development

McLuhan's famous "three-stage theory of civilization evolution" includes the oral communication period (tribal culture), the written and print period (detribalization), and the electronic communication period (retribalization). Humanity has experienced a process of "tribalization—detribalization—retribalization," with electronic media transforming the entire society into a "global village."

In the oral communication stage, information could only spread within limited ranges due to technological constraints. However, humans perceived the world in a comprehensive, multi-dimensional manner, and their skills were holistic. People were integrated beings—"tribal people." In the written and print communication stage, human perception became visually oriented. Print technology fostered knowledge centers and engendered a stratified, elitist social psychology. The invention of writing and the emergence of labor division also fragmented and compartmentalized individuals into incomplete, non-tribal beings. In the electronic communication stage, people in different geographical locations can instantly obtain desired information and can regather across larger ranges through networks, as if living together. Consequently, human society has begun "retribalizing." The original aspiration driving humanity's continuous exploration of communication technology is to achieve what McLuhan described: the ultimate return of human communication to its primordial state. Technologically realizing this "return" means infinitely approximating communication scenarios. Media are extensions of humans, extensions of how we perceive and process information after perception, and different technologies affect the structure of human perception.

2.3 Media Convergence Requires Technological Innovation

Media convergence has risen to a height concerning national governance and stability. It aims to leverage the achievements of the information revolution and employ new technologies to build new types of communication platforms, thereby advancing media convergence in depth.

On January 25 this year, General Secretary Xi Jinping, presiding over a collective study session of the Political Bureau of the CPC Central Committee, profoundly pointed out that globally, media intelligence has entered a stage of rapid development. We must strengthen our sense of urgency and mission, promote independent innovation in key core technologies, achieve continuous breakthroughs, and explore the application of artificial intelligence in information collection, production, distribution, reception, and feedback.

The tide of the new-generation internet is driving transformation of traditional media across multiple dimensions—including form and structure, strategic direction, management methods, production modes, development engines, communication channels, support platforms, business models, and carrying media—with both depth and breadth. This transformation is global and systematic, and the difficulties and contradictions facing traditional media transformation are universally experienced across the industry. We remain on the continuous journey of deep media convergence; change is happening around us imperceptibly, moving from quantitative to qualitative transformation. Technological progress is gradually turning our visions into reality and accelerating the pace of transformation. In this process of deep media convergence, dependence on technology is increasing, and the responsibility borne by technology is growing heavier. As media technology workers, we shoulder a heavy and long-term responsibility—this is the message from a veteran on the media technology front to newcomers.

This book seeks to convey a rational attitude and critical thinking toward new technologies. Every advance in media does not occur spontaneously or arbitrarily but results from humanity's deliberate pursuit and collective effort. The birth of each new communication medium emerges from the "cross-fertilization" of different ideas, technologies, and media. What we must most reflect upon at present is that since entering the new century, various new business forms, concepts, and models have spawned numerous new media, presenting a dazzling array of forms that overwhelm the senses. However, it is not difficult to discern that despite different manifestations, most represent "utilitarian" minor improvements or application innovations in terms of science and technology, ultimately lacking major original foundational innovations like laser phototypesetting.

Author's Note

In the late 1980s, China's news media industry entered a period of rapid development, launching the modernization of Chinese news media. A large number of outstanding university graduates began joining newspaper offices, radio sta-

tions, and other news organizations. Many institutions of higher learning also began establishing media-related majors, and media technology increasingly attracted attention. However, most relevant learning materials and theoretical textbooks were translated and pieced together, ill-suited to the needs of our rapidly developing media industry. At that time, I conceived the idea of compiling a *Introduction to Media Technology* that could clearly explain both theory and practice in an understandable way. For this purpose, I repeatedly consulted with senior colleagues such as Director Sun and Xinhua's Hua Shaohe, but unfortunately failed to complete the manuscript due to insufficient accumulation. During this period, I did compile and publish several practical technical reference books, such as *Windows NT4 Registry Expert Guide*, *The Main Structure of the Internet*, and *Website Construction and Planning Guide*, which provided some consolation.

This time, as Director Sun's assistant participating in the compilation and publication of this book, I have benefited immensely. Over the past three years, the effort, dedication, and hardships Director Sun has invested in this book are difficult to express. Sometimes, for a detailed description, a character story, or an image in the book, he would extensively consult materials, trace origins, verify repeatedly, and solicit opinions from parties involved or witnesses, fearing errors or omissions. Even in a hospital bed, he would ponder titles and verify materials. His pursuit of excellence and meticulous academic rigor have left a deep impression on me.

In 2019, *A Historical Narrative of Science and Technology Development in China's News Media* was finally published. This book is neither a chronicle of news media technology development nor a documentary record of informatization construction in the journalism field; it is neither an academic monograph on communication theory nor a professional book on media technology—it appears somewhat "hybrid." Why compile such a book? In Director Sun's original words to me: "We have a responsibility to document China's rapidly evolving media technology development and leave some memories and materials for future generations."

As a philosopher once said: "Telling others the truth you know is a form of justice; telling others the common sense you understand is a responsibility; telling others the facts you have learned is a moral duty." The *Book of Tang: Biography of Wei Zheng* states: "Using bronze as a mirror, one can adjust one's attire; using history as a mirror, one can understand the rise and fall of dynasties; using others as a mirror, one can discern one's own gains and losses." Recording these truths from the field of news media technology may be the original aspiration and mission behind editing this book.

Comrade Sun Baochuan is a master in the field of media technology—a pioneer, leader, organizer, builder, and witness of China's news media technology over the past four decades of reform and opening up. As a veteran news technology worker who has labored in silence without seeking fame, he continues writing in his seventies, contributing his remaining energy to media technology

development—truly inspiring our heartfelt admiration and profound respect.

Author Bio: Zhu Youqin holds a Ph.D. in Computer Applications and completed postdoctoral research at Tsinghua University's Management Science and Engineering Postdoctoral Station. He is a senior researcher who received the State Council Special Allowance in 2001, was awarded "Outstanding Young and Middle-aged Expert with Distinguished Contributions" by the Shandong Provincial People's Government in 2004, and was selected for the "National New Century Hundred, Thousand, and Ten Thousand Talents Project" in 2007. (Author's affiliation: Shandong Dazhong Press Group)

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