1.1 History of Human Communication

1.1.1 Changes in Media Over the Years

From time immemorial, communication, especially an effective one, has always been the basic pursuit of human activities. However, the “helplessness of communication” that frequently arises in real life is inevitable, such as meanings not being understood, feedback being ignored, the spread and interference of rumours, the lack of information and knowledge and the deprivation of the right to speak. Such imbalance in communication is even more pronounced during complex, volatile social communication that transcends time and space. Meanwhile, new media technology and application continue to increase the speed and scope of information communication, reception, transfer and feedback. Technological advancement has also changed media use and consumer behaviour, which triggered the transition of the audience’s cognitive structure. In addition, the interactive influence between diverse individual psychological factors, complex social structure and economic, cultural and political fields has created a novel and unique media environment.

However, technological inventions did not appear out of thin air or happen overnight. During the long process of development of human communication, technology, culture and society interweaved and interacted to produce media forms that belonged exclusively to that time and space. Hence, we usually present the knowledge of human communication studies focusing on the historical periods with major changes in the forms and features of media technology. Each revolutionary wave that caused tremendous changes in the history of human communication was an effect of media technology. After the modern industrial revolution in particular, the significance of technology has prompted increasing reflection on modernity and postmodernity in the academia.

Friedrich Krotz believed mediatization was interconnected with globalization, individualization and commercialization, which were regarded as the meta-process that affected the long-term living environment of human beings in terms of society,
culture, politics and democracy. Mediatization, a regular existence, is a frequently discussed topic in communication studies, such as the role it plays in daily life, culture and social rituals, or from the perspective of the stages of communication history, how it shapes different communication subjects, forms, models and results. From ancient media (mainly verbal communication), writing culture, printing revolution, imaging technology, radio broadcasting, digital media and the Internet to the emergence and development of artificial intelligence (AI) in recent years, the course of development shows the significance and influence of interaction between media and technology during a certain historical, cultural and social processes.

The countless processes of information flow of every scale throughout history constitute the entire process of development of human communication, which is in fact the evolutionary history of media and technology. The examination of the history of human communication from the perspective of media changes may roughly be divided into four continuous stages, namely verbal communication, handwriting, printing communication and electronic communication. Despite having four successive stages, no distinct dividing line is found between each—in fact, they complement each other and overlap. As it inspires changes in the means of human cognition, the alternating evolution between communication forms, spatial concepts and communication effects as brought about by different media is reshaping the details of human life and the overall changes of social reality.

Verbal communication, also known as spoken-language communication or oral communication, refers to a communication means whereby a communicator (a speaker) communicates and conveys information to a recipient (a listener) by producing sounds through the oral cavity assisted by the use of specific words and phrases, grammatical structures and non-linguistic signs. It is widely known that during the long history of human evolution, human beings have gotten ahead of other mammals and learnt to use tools and built society using languages. Human beings mastered the tools of language and created a “semantic world” that no other ordinary animals have. Hans-Georg Gadamer, a German philosopher, believed that language itself was a worldview. It may be said that human beings created a world because of language, which gave rise to their relationships with the world and that in turn produced a unique attitude towards it (Fig. 1.1).2

Language is a form of meaning and a vessel of information; its production is closely connected to human beings’ needs to communicate information. As Marx remarked, language was initially born of the urgent needs to communicate with others.3 In a primitive society, human production was low, and the ability of individuals to survive natural disasters was almost non-existent. Verbal communication as a primary means of communication and contact allowed individual human beings to come together and form a stronger, collaborating tribe and community. In a historical context with the appropriate conditions, verbal communication strengthened the cohesiveness of society members, and extended the attribute of social synergy upon

1Krotz (2007).
2Ashford et al. (2005).
3Marx and Engels (1995).
In terms of human communication activities, verbal communication is the oldest, easiest and most basic form of communication. It is diverse and may be widely applied, whether it is whispering, words on the street, reciting and singing, orally passed-down folk songs, preaching and lecturing or open gatherings. Verbal communication exists as dialogues between two or more people and derives meaning from the linguistic exchanges. People may elucidate the communication using non-linguistics actions such as eye contact, body language, facial expressions, sound elements and spatial distance (Fig. 1.2).

However, the limitations of verbal communication are plainly evident. Firstly, as a means and a tool of communication, language is unable to free itself from the limitations of the communicator and recipient and intersubjectivity. Secondly, verbal communication is better suited for the communication of information in a confined space and has a relatively small communication range without media assistance. In addition, verbal signs are transient and harder to preserve. The limitations stated above also means verbal communication has a smaller informational load, lower content accuracy and greater temporal and spatial limitations. As society and civilization continuously progressed, human beings searched tirelessly for tools such as drums, fires, knots and flags to convey and preserve information. Meanwhile, the language mechanism was maturing, but the monotonous verbal communication had yet to satisfy the development needs of individuals and society (Figs. 1.3, 1.4 and 1.5).

If the birth of language transformed our ancestors from animals to human beings, then the invention of writing was a milestone that saw the evolution of a primitive human society to civilization tens of thousands of years after the birth of language. During such communication, auditory signs are replaced by visual ones, which to a certain extent allows language to throw off its shackles and become relatively independent and tangible. If language is a direct sign of things, then words are the
indirect signs of things. As the symbols of human civilization, words are written signs that record human language and thinking. Unlike verbal communication that may be acquired naturally, written language requires human agency to learn to read and write, and such human characteristics add to the definite communication purpose of written communication.

Primitive written media such as clay tablets, stones, leaves, oracle bones and sheepskin basically were born alongside pictures and evolved with writing. They led to major breakthroughs, temporally and spatially, in information communication,
and to a great extent make up the limitations of verbal media. Written communication provides a relatively independent means for the storage, accumulation and delivery of information, and human memories, experience and knowledge no longer have to rely on human brains for survival and their life is greatly extended. Aided by written signs, language cast off the shackles of distance and environment in verbal communication, before moving on to continuously expand the living boundaries and
social space of human communication and interaction. Meanwhile, as the use of written signs became extensively adopted and standardized, the accuracy of communication content also increased tremendously, which to a certain extent inhibited the unrestrained spread of rumours commonly seen during the age of verbal communication. It may be said that the breakthroughs of written media in temporal and spatial limitations actually affected the overall development process of human society. For example, the standardization of writing effectively organized the legal and political systems, which in turn make structured centralized rule possible. Furthermore, cross-region economic communication was simplified and became more efficient, leading to the development of commodity (Fig. 1.6).

Writing, in addition to being a tool, has distinctive cultural characteristics. According to Wilbur Schramm, an authority on mass communications, the rise and the similarities and differences of different cultures were evident in the diverse language families and their writing. As a subsystem in the overall operations of a cultural system, writing also connects the characteristics, attributes and content of individual subsystems as a form of symbolic expressions. In such sense, writing with a stable internal structure may be regarded as an exclusive form of expression of a culture that helps us continuously approach, experience and understand the numerous and complicated cultures.

In the prologue of Explaining Graphs and Analysing Characters, it was stated that the development of writing was the foundation of classics studies and imperial rule and allowed the forefathers to be known to the descendants and the descendants to learn about history. The invention of writing and the introduction of documentation were major undertakings in the history of human communication. They changed the fact that human history could only be orally passed down through myths or legends, and guided human beings from a “barbaric age” towards a “civilised age”. Despite the limited productive forces and technological standard that meant writing or written media was unable to escape from pitfalls such as inefficient communication, slow communication speed, small information load, limited communication scope and man-made errors, it is undeniable that the emergence of writing provided a more stable, long-lasting and reasonable means of presentation for pluralistic civilizations.

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4Schramm (1984).
The advancement of human social civilization was thus expedited, as a preliminary foundation of mass communication in its true sense was born.

Actually, human beings underwent a lengthy period of hand-copied texts, which had not only higher media costs but also subtly set a certain cultural threshold, as the initiative of communication was objectively limited to the upper classes. It was not until the printing revolution that the situation slowly improved. Driven by the idea of expanding the scope of communication, helped by the needs and acceptance of the public towards structured text and following the grasping of text-copying techniques by professional printers, the print media became the third major milestone in the development history of communication media after language and writing, truly marking the advent of the age of mass communication.

China’s print media began in the sixteenth-century BC, and in between the development of stamps in the eleventh-century BC and stone rubbing in the third-century AD, woodblock printing, clay moveable types, wooden moveable type and paper-making emerged and spread across East Asia and the West. They were the beacons that guided human beings towards the print culture and made indelible contributions to the development of world civilization and human society. However, the real media revolution was considered to have taken place when Johannes Gutenberg, a German craftsman, invented the metal moveable type in 1450. The invention took advantage of the fixed letter combination of the Western phonetic alphabet and made machine production and mass reproduction of written information possible, thus enhancing the quality of human communication. Following the industrial revolution in Europe, information communication picked up a new pace with the help of electricity and mechanical power (Fig. 1.7).

The advent of printing machines and mechanized papermaking induced the birth of modern newspapers and magazines and boosted the rapid communication of cultural products. Meanwhile, special communication bodies and systems were created. The systematic and rigorous processes of media communication bring together natural acts of communication and greatly enhanced communication efficiency. As literacy level improved, print media began to play an increasingly critical role in daily life and even social transformation. The advancement of printing technology not only made the reproduction of text information possible, but also created a new cultural form dissimilar to the verbal or written age, and profound influence was seen in fields such as politics, culture and education.

As Schramm remarked, textbooks made the provision of large-scale public education possible, while newspapers and magazines provided a channel for people to understand and participate in politics during a period of general discontentment with the division of powers. Following the popularization of the print media and the elevation of literacy and cultural levels, the idea of freedom of speech and publication had also been awoken, nourishing the budding democratic thinking in the West. Charles Horton Cooley, a representative scholar of the Chicago School, asserted in his book *Social Organization* that “[p]rinting means democracy”; the profound significance that communication had for social development was underscored from a media
determinism perspective.⁵ In fact, not only had the print media ended the knowledge monopoly and the exclusive communication rights of the minority, which provided powerful ideological weapons to throw off the feudal shackles of the Middle Ages, it also encouraged exchanges and communication among countries, ethnic groups and social classes, providing a space for the development and extension of humanity and morality. Marshall McLuhan believed that as a new medium print matter could end the narrow regional and tribal views between the mind and society and between space and time.⁶ Undoubtedly, in the history of media communication, mass communication and print media almost took off and evolved simultaneously, which in turn accelerated the beginning of the modernization of human society.

Later, human communication entered the stage of electronic media. Broadly speaking, electronic media refers to all the media that rely on electric current to communicate information, which include privatized media such as telephone, telegram and mobile phones and public media such as radio, television and the Internet. In the narrow sense, electronic media refers exclusively to public media.⁷ In terms of its development, electronic media has undergone the transition from telegram, radio, television to the Internet, during which period the activities of human communication have experienced tremendous changes. The entire social-information system

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⁵Cooley (1909).
⁶McLuhan (2007a).
⁷Li (2003).
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Fig. 1.8  Samuel Morse, the father of telegram from the USA, and his invention

has continuously improved and even formed a relatively independent communication system.

Back in 1837, Samuel Morse, an American, invented the first telegraph of the world. Seven years later, Morse sent the first telegram from Washington to Baltimore with a verse from the Bible: “What hath God wrought!” which perfectly reflected the emotion towards the advent of the age of electronic media. The arrival of telegram overcame the spatial limitations related to the communication of verbal, written and print media. Meanwhile, the scope and efficiency of information communication were immensely improved, greatly facilitating social and private life (Fig. 1.8).

As the revolution of science and technology took place in the West in the nineteenth century, along with the needs of imperialism for external expansion and maintaining colonialism, radio media slowly emerged against such background. In addition to allowing the actual recording, copying and preservation of human voices, it possessed many advantages, including timeous information communication, easy to understand and few spatial limitations, which led to the qualitative leap in the scope and speed of information communication (Fig. 1.9).

The first radio broadcast of the world

At around 8 on Christmas Eve in 1906, Fessenden, a professor at the then Western University of Pennsylvania in Pittsburgh, successfully made the first radio broadcast transmitted from a 128-metre-tall antenna of National Electric Signalling Company in Brant Rock, Massachusetts. The radio broadcast was also the first in the world.

Film and television media are mass media with sounds and motion pictures that satisfy the audio–visual sense and offer a sense of presence. The television media has undergone half-a-century’s experiment before slowly turning from a niche product toyed by scientists, inventors and radio enthusiasts into a medium of mass communication. Films were born after television, when breakthroughs were achieved in optics, acoustics and mechanical engineering. The emergence of film and television
media meant that sound- and image-information systems were no longer bound to human bodies. Not only can they exist independently and be stored easily, but they also provide more vibrant means to render the collective memories of human beings. As a result, social, cultural and historic preservation has richer forms of expression, while the efficiency and quality of knowledge accumulation and cultural heritage have also greatly improved.

The development of electronic technology ushered in and promoted the arrival of the age of digital media. Following continuous improvement and evolution, the Internet has finally created an unprecedented, utopian virtual world, which is showing more and more significant reaction to the real world. The emergence and arrival of digital media have strengthened the bilateralness of the communication process, as the unilateral, linear model upgraded to a multi-lateral nested model, and the parties may fully engage in real-time communication and interaction. Digital media has also integrated multiple media features, whereby text, sounds, frames and images are converged to an organically interconnected communication platform. Furthermore, in the age of globalization of information communication, the richness of media resources to a certain extent breaks up the monopoly of information resources by a few media bodies.

During the 1970s, social media was born out of the Internet. As computers and the Internet advanced during the 1990s, social media developed even more widely. As the model of user-generated content matured, social networking services began to thrive and grow into a media force that could not be ignored. The monotonous,
passive status of recipients during the processes of conventional mass communication was gradually overturned, and their right to speak was re-assigned, as information recipients became the expressing subjects. Meanwhile, the term “recipient” has in recent years been slowly replaced by the term “user”. As different social media and self-media platforms sprang up, they strongly evoke the communication desire of the public in the information age with their grassroots, diverse, interactive and original in nature. Users may freely access different information, present their viewpoints and effectively communicate them using media. As the right of access to mass media becomes a reality and the sense of participation of the public continues to strengthen, their self-identity, sense of belonging and social responsibility are also gradually reinforced. As a result, the online public space for the protection of public interests and welfare is being built, leading to the regular emergence of platforms for “seeking advice from netizens on microblogs” and “online help”.

The right of access to mass media

The right of access to mass media basically refers to “a legally enforceable right, based on which an ordinary, private individual may demand the media to provide coverage or dayparts, unconditionally or under certain conditions and freely or paid, for the expression of personal opinions.” In 1967, J. A. Barron published the article Access to the Press. A New First Amendment Right in Harvard Law Review, in which he first proposed the concept of the right of access to mass media. In 1973, he published the book Freedom of the Press for Whom? The Right of Access to Mass Media, which systematically explained the concept of the right of access to mass media.

Focusing on the current process of communication, smart media communication is extensively and intensely infiltrating every aspect of production and life. Smart media comprises AI, information technology and big data. In addition to understanding its users and deconstructing and reshaping social forms and people’s lifestyles, smart media better integrates clientele and services to provide users with an application environment with great experience. The age of smart communication not only extends the pivotal role of information resources in the age of digital communication, but also loads information upon smart technology to create a communication ecological environment with man as the subject, which is highly vibrant and creative and shares the pulse of the actual society.

Harold Adams Innis, a Canadian pioneer of the Toronto School, once remarked that the advantage of a new medium would lead to the birth of a new civilization. A broad overview of the evolutionary process of technology and communication media reveals that the evolution of communication media involved constant rectification, improvement and stimulation of the social-information system. Media and technology have undergone a process that began from scratch, from low level to high level and from simplicity to complexity. The old and new media did not change and alternate in a one-off and orderly manner, but rather in a converged, interwoven state. Technological advancement means communication media is no longer scattered

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8Lin (2002).
9Barron (1973).
10Innis (2003).
about people or simply an intermediary. Instead, communication media infiltrates society as a complete organism that combines individual perception and experience of the world, which in turn influences imperceptibly and reshapes people’s thinking, life and even social reality. As a result, reflection on the changes in media forms should not merely focus on communication technology but also include the scientific understanding of the interaction and significance of technology, culture and society, so as to truly grasp the development and the patterns of human communication.

1.1.2 Origin of Technology

When going through the historical development of human communication through the ages, a question often arises: Does technology determine societal changes? The answer undoubtedly is negative. Technological determinism alone cannot explain the complex interaction among technology, culture and society. Many scholars have studied the interaction from different perspectives adopting different means and have established a relatively comprehensive knowledge prospect. Nevertheless, the influence of science and technology on media and social development may not be overlooked. In the interdisciplinary field of Science, Technology and Society, scholars regard knowledge competition as the choice of truths that may be deemed as notable and significant, just like choosing assertions that may be deemed as correct or false, which all have serious consequences. Its profound significance lies in the clarion call that is being sounded to awaken the world to recognize the importance of media to society and that of technology to communication, which remind us to change our way of thinking when dealing with and understanding issues. Here, the original media theorist Marshall McLuhan (1911–1980) and his distinct media technology theory must be mentioned.

1. Marshall McLuhan (1911–1980)

During the 1960s, McLuhan was a highly influential star scholar who was so popular that even Woody Allen, the most well-known intellectual of New York, invited him to guest star in the romantic comedy Annie Hall. However, McLuhan’s line in the film was truly puzzling: “You mean my entire fallacy is wrong.” The entirely unintelligible sentence is not unlike the unusual uproar he had caused in the communication theory field at the time. The New York Herald Tribune once called him the most important thinker after Newton, Darwin, Freud, Einstein and Pavlov, whereas academic groups and conservatives dubbed him “the Dr. Spock of pop culture” and “metaphysical wizard possessed by a spatial sense of madness”. However, the advent of the age of digital media had put him back on the pedestal, as media ecology re-entered people’s vision from the secondary fringes of communication studies (Fig. 1.10).

Well-known statements and phrases, such as “the medium is the message”, “media is the extension of man”, “hot media” and “cold media”, became the key thinking of

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11Sismondo (2015).
McLuhan. “The medium is the message” refers to how media technology changed the way people perceive and think about the world, which consequently changed our collective thinking and behaviour. In his *The Gutenberg Galaxy: The Making of Typographic Man* (1962), McLuhan reasoned that media technology such as the alphabetical-writing system, printers and electronic media had changed individual consciousness, which in turn changed the greater social structure. He therefore considered that the truly meaningful and valuable information was not the communication content from different periods, but rather the nature of the communication tools of the period and the possibilities and social changes they brought about. McLuhan emphasized the criticalness of media forms and regarded it as the key factor influencing human behaviour and social life. The research perspective that regards media as environments through the revelation of the hidden attributes of media environments has also become a key train of media ecology.

“Media is the extension of man” refers to that any medium is the expansion or extension of human feeling and senses. The development history of media and society is also that of human senses, as they “unify”, “divide” and “re-unify”. A medium refers to a kind of communication technology, which media ecologists from North America consider include not only mass media such as newspapers, radio, television and the Internet, but also parchment, stones, clothing, mathematics, advertisement, prose, currencies and much more. In *Empire and Communications*, Innis
McLuhan was of the opinion that the extension of media broke the balance of human senses, leading to the restructuring of the sensory ratio,\(^\text{12}\) which in turn rendered a complete individual desensitized and fragmented. The sensory bias of media enriches the overall theory of media bias after the introduction of ideological bias, anterior- and posterior-area bias and temporal and spatial bias of media.

McLuhan regarded human civilization as the product of technology. He focused on how the human environment was re-rendered and shaped based on an incomplete, extended image. He firmly believed that extension had the unique attribute of transferring power from source objects to extensions. Just like the two concepts he proposed regarding the categorization of media: the “hot media” and the “cold media”, the former conveyed clearer information, so recipients did not require additional senses and associations to understand it, whereas the latter was the exact opposite. Although the categorization has no consistent standards and has clear limitations, it opened up the space for media imagination.

McLuhan once predicated the trend of future development would be the extension of the central nervous system through the electronic media technology, which would free people’s consciousness from the shackles of the mechanical world and allow it to travel the universe. The image of the future in the context of smart media is precisely an overlap of the real and virtual worlds through the extension of every human sense, which properly integrates the objective and subjective worlds. As a result, the virtual environment created by images will be infinitely close to human consciousness, and McLuhan’s predication may well become reality.

2. Harold Adams Innis (1894–1952)

Looking back at the inspirations for the many theories and research methods of McLuhan, Innis was a pivotal figure. Harold Adams Innis was a Canadian economic historian, economic theorist and communication scholar. He has been called “the first Canadian-born social scientist to achieve an international reputation” and “the father of Canadian Economic History”. Innis had a profound interest in how media changed the entire social civilization. As a pan-media advocate, he attempted to conduct comparative research on the mutual relationships between communication and politics and between economy and religion by presenting a large number of facts and examples throughout the historical world. Such research approach of dynamic deductive analysis has also become a key ideological source for media ecologists such as McLuhan and Neil Postman.

“The bias of communication”, as the most critical component of Innis’s communication ideas, explains the connection between the rise, development and fall of civilization and a certain communication form and the commencement, spread and variation of the media upon which it depends.\(^\text{13}\) Innis maintained that media bias was caused by the coupling of communication media and the information, knowledge and power attached to them. Based on their characteristics, communication media may

\(^{12}\)McLuhan (2007b).
\(^{13}\)Xu (2012).
be divided into media with light but hard to preserve materials that aid spatial extension, including paper and telegraph, and “time-bias” media with heavy but durable materials, such as parchment and stones. The different media biases had led to differentiated biases in communication means. For example, expression cultures related to legends, myths and drama showed bias towards verbal communication, whereas cultures based on print media such as newspapers and books biased towards written communication.

However, Innis argued that influenced by media and communication biases, fissures appeared in the internal consistency and continuity of cultures and systems. He claimed media technology could transcend time and space and extend but could not possibly strike a balance. Media that extended time were biased towards encouraging the upholding of social traditions, whereas media that extended space encouraged social expansion and drastic changes. For instance, city-states and communities in ancient Greece were spirit and moral extensions of verbal communication, whereas written communication alienated the relationships among people. The unilateral communication paths led to power concentration, which saw the Roman Empire rose to power with its tremendous spatial control.

As a pioneer in media ecology, Innis not only liberated media from being regarded as a lone and monotonous tool, he clearly described the interaction between media and the entire social system, while reminding people to maintain the corresponding balance when using media to promote positive social development. Just as Innis’s ideology exuded enthusiasm and nostalgia for verbal culture, it also serves as a cultural warning for how modern humanity, who ignores actual communication, indulges in virtual survival and even regards virtual reality (VR) as a way of life.

3. Jean Baudrillard (1929–2007)

Referring to the concerns about technology and the nostalgia for face-to-face communication, Jean Baudrillard, the French philosopher, postmodernism theorist and media and social theorist who has been referred to as “the high priest of postmodernism”, shared similar sentiment. The “McLuhan of France” had no shortage of ideas and interpretations of communication media, technology and human society in his impressive yet unconventional ideological research (Fig. 1.11).

![Jean Baudrillard](image-url)
In his study of postmodernism society, Baudrillard conferred enormous power on media. He maintained that media, simulation and cyber blitz had constituted new experience fields, new historical stages and new social types. In his later academic research, simulation and simulacra, media and information, science and new technology and implosion and hyperreality constituted his key postmodernism-theory world and provided a specific model for how media of omnipotent and spontaneous social power could play its role. In his *Simulacra and Simulation*, *Symbolic Exchange and Death* and *Seduction* from the 1970s and the 1980s, Baudrillard adopted a scientific and technological perspective and regarded media as the primary “simulators” in disciplines and fields such as biogenealogy, bionics, holographic principle and computer simulation. He depicted a real field created by media-produced code, imitations and simulations, which drove human society towards new historical stages and social types. He contented that mass media such as television that has profound influence on the recipients often copied images, symbols and code to create and support hyperreality. Baudrillard claimed that the rapid rise of symbols and information in media was removing meanings through the counteracting and breaking down of content, before completing the disintegration of meanings and the process of eliminating the difference between media and reality. He asserted that communication aided and accelerated the degeneration of modern production fields towards a postmodern simulacrum society.\(^\text{14}\)

The medium is the message does not merely mean the disappearance of information intermediaries, but also that regardless of the content or form, an intermediary force between one reality and another will cease to exist. In the past, we could regard communication media as a mirror reflection of phenomena and reality. However, the hyperreality created by modern mass media and even smart media is doubtlessly more realistic than the reality as perceived by recipients, which may lead to the disintegration and disappearance of reality. As media environments and real life become one, humanity will become more lost in the grey area between virtuality and reality and unable to identify the truth. The criticism on postmodernism social media that Baudrillard voiced in his social theory and media criticism primarily focused on mass media in the electronic-communication age as research subjects. However, if the perspective is shifted to the surging smart-communication age of now, Baudrillard’s ideas and concepts of simulation and hyperreality may still serve as critical perspectives and practical tools in the analysis of smart media and platform society based on cybernetics.

4. Manuel Castells (1942–)

The fourth representative in the tracing of the ideological sources of technology is Manuel Castells, who has dabbled in different academic disciplines. He turned his attention to the influence that information technology has on society towards the end of the twentieth century and is hailed by *The Economist* as “the first significant philosopher of cyberspace”. Focusing on the interaction between communication and society, Castells formulated the “network and information-society theory” in

\(^{14}\)Chen and Lu (2007).
his *The Information Age: Economy, Society and Culture*, which triggered beneficial discussions in the academia. He identified phenomena such as information capitalism and digital divide, revealed the internal logic of information technology and social changes and illustrated the key process of social structural changes (Fig. 1.12).

Castells maintained that the culture of a network society possessed the characteristics of “real virtuality”, which comprised the “space of flows” and “timeless time”. In the age of network information, the spatial concept related to the conventional sense and venue was disintegrated and reassembled into virtual functional networks, creating a unique spatial form in which the concept of time fell apart and information could interact. Castells regarded the “space of flows” that emerged in the information age as a social expression instead of a simple mirror reflection, that is, the space was the society itself and not a copy. The space in the network society organized the time, and events in the “space of flows” were no longer arranged consecutively in a linear chronological order, as a kind of undivided time was established. Building upon this basis, Castells put forward the concept of “timeless time”, which explained new issues related to the definition of flexible network working hour and the life cycle of network humanity.

The network society has created new communication forms and power categories. Social operation in the information age relies on the powerful network environment and communication system, and Castells asserted that the control of information, speech and symbols was the direct control of power. As a result, communication in the information age extends power towards the boundaries of nations and ethnic groups, and the acquisition of the right of access to mass media impacts and even shatters the control that the ruling class has over the right to speak, which eventually leads to “equal rights” in communication. It is therefore evident that Castell’s thinking contains the exploration of interweaving elements such as technology, culture and power, which provides a unique perspective for the examination of the development of a network society. His argument concerning temporal and spatial concepts, communication power and media power has acquired a whole-new research context in the age of smart communication and is worth for further exploration and reflection.
5. Nicholas Negroponte (1943–)

Professor at the Massachusetts Institute of Technology (MIT) in the USA and founder and director of the MIT Media Lab, Negroponte is hailed as a “digital prophet” by Western media due to his consistent advocacy of the transition of social life with the help of digital technology. He is also one of the most influential masters in the fields of the Internet and communication technology (Fig. 1.13).

In his 1995 book Being Digital, Negroponte looked at the status quo of the use of smart media across all sectors of society in dedicated chapters, which to a certain extent drafted the blueprint for the development of smart media. For example, he explained the reason that VR produced a strong sense of presence: binocular disparity and mentioned that the application of VR technology frequently used a helmet. He further identified the two most critical factors that affected the quality of the sense of reality, namely image quality and response time, which are two key directions of focus of contemporary VR technology.

The common media-content distribution mechanism based on algorithm application of today has also appeared in Negroponte’s earlier writings. He claimed that newspapers based on an electronic medium could be communicated to the recipients in the bit form, and the interface agent would screen and classify the information like a digitalized relative who knew you well, before delivering the most suitable information to the readers in the end. This objective is achieved precisely by the AI technology that is currently attracting widespread attention. Negroponte wrote in the prologue of Being Digital that “the best way to predict future is to create it”. Actually, he simply revealed the future possibilities to the public, and some of which became the future in our hands.

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15Negroponte (1995).
6. Paul Levinson (1947–)

Levinson’s ideas drew intense attention and were widely accepted in the smart media environment. As a successor in media ecology, his viewpoints involved topics and the three stages of media evolution (toy—mirror—art), which comprised theories such as “humanising trend” and “remedial media” and are to a certain extent looked up to as the accepted criteria among smart media researchers. Levinson asserted that the evolution of media was continuous, dynamic and affected by all social figures and environment, which allowed media to have continuous and lasting effects. In the end, media would complete a humanized evolution following the expectations of the recipients and society.\(^{16}\) Meanwhile, as technology complements one another, the media needs of humans are also being satisfied, and eventually a consistent state is formed with the current complex social environment. As media continues to advance, the connection between the necessary technological operation of media and the necessary communication that arises from human activities will become increasingly tight, before they integrate as one (Fig. 1.14).

Levinson once candidly remarked that media to a certain extent evolved based on human wishes and desire, which gave it human attributes and forms of human communication. Moreover, media evolution had gradually integrated different forms

\(^{16}\)Levinson (2017).
of media technology. As media evolved, all equipment slowly converged as one to work together to process information of all kinds and nature from the social environment, before eventually forming a unified and multi-dimensional information analysis and processing system. Levinson considered media development and evolution as driven by human needs, which is why media was naturally given human attributes and forms of human communication. As a technological optimist, Levinson believes human rationality and agency will complete the control of technology, and humanization is the future trend of media development. It is not only media that has entered a smart-communication age, but everything in social life will learn to understand human ideas and thinking, as the distance between man and machines continues to reduce until man and machines co-exist. As machines become smarter, will Levinson remain so optimistic about technology? We shall wait and see.

7. Kevin Kelly (1952–)

The founding executive editor of WIRED magazine, Kelly is regarded as the spokesperson and observer of “network culture”, as well as a “maverick”. In terms of the content, his Out of Control, The Inevitable and What Technology Wants have already gone beyond the field of Internet technology and require interpretations from different angles. Similarly, he boldly offered his prediction for the scientific and technological development over the next three decades. He claimed that AI would be an inevitable technological means, and future social networks would be a dynamic, automatic and expandable network structure, not unlike a mirror world or “The Mesh”. Humanity would enter the next immersive age, in which everything would have a chip, and everything could become a computer and exist once again in the virtual world. As a result, our entire world would be digitized, ushering in a true world with the Internet of Everything (Fig. 1.15).

In addition, Kelly reckons the value of face-to-face communication will not disappear—in fact, mechanical and technological development may even facilitate social interaction. He is positive about the prospects of virtual technology, which allows

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Xu (2017).
people to see their friends on a screen and offers the corresponding sense of interaction that humanity greatly desires. He asserts that media environments based on VR and augmented reality (AR) will exist with the strongest social features among all the social media. Kelly’s remarks reveal analysis of and reflection on ideological and technological fields such as cybernetics, systems theory, information theory, AI and VR. It is precisely through such cautious reflection on and bold imagination of machines, systems, organisms, technology and society that Kelly guides us through his vision for the future, tests predictions of technological developments and foresees the future.

During the process of media communication and technological development, in addition to the abovementioned thinkers and scientists of communication technology, the progress of research from different fields and schools of thought using different means and approaches has never stopped. For instance, represented by Bruno Latour (1947–), sociologists of scientific knowledge proposed the Actor–Network Theory in the 1980s. In the context of smart media communication, the theory regarded all human and non-human actors (such as the Internet of Things (IoT) and AI, machine-algorithm, VR and AR technologies) as equal and included them in an interactive network. The network nodes with equal, decentralized actors emphasized the value of non-human actors and the equally important status as the human actors. We are thus truly convinced by such viewpoint: It is precisely such spectacular ideas that prompt the historic leaps of media communication again and again. Lastly, let us return to the question at the beginning of the paper: Does technology determine societal changes? Our answer is: Technology does not entirely determine societal changes, but it does drive, influence and accelerate societal changes.

1.2 What Is Smart Media?

1.2.1 Understanding AI

Against the background of smart-technology transformation, media forms are undergoing tremendous changes, and smart media and its new social practice are reshaping social forms and people’s perception and way of life. In this increasingly intense and dramatic smart-technology revolution, the technological waves have set off gigantic changes, and media faces opportunities and challenges in its development.

It is common knowledge that the invention of the steam engine by James Watt marked the arrival of the steam age, and Thomas Edison’s light bulbs opened the door to the age of electricity. Meanwhile, the invention and application of atomic energy, computers, spatial technology and bioengineering essentially heralded a revolution of information-control technology, which prompted for the rapid development of new industries and tertiary industries, among them the swift popularization of computers created a brand-new information age. Currently, AI technology is bringing man and machines ever closer, and machines are slowly able to simulate human behaviour,
perception and thinking. The combination of man and machines has reshaped the role of man in communication and created an immersive media environment with stronger interaction. As the results of digital revolution continue to benefit humanity, a new round of revolutionary waves triggered by smart technology has unveiled the age of “zero-hour smart media”.

From a biological point of view, what separates man and animals is chiefly the intellectual abilities. The moment that man separated from animals is abstractly referred to as the “zero hour”, which was the first revolution of human intellectual abilities. Building on the natural intellectual abilities of man, AI would trigger the second revolution. Influenced by the waves of AI, media communication entered a new development stage known as the age of smart media communication.

The objective of smart media studies is to create artificial systems that may simulate human intellectual abilities through the study of the patterns, so computers may complete tasks previously requiring human intelligence to accomplish. In other words, certain human intellectual actions are simulated through the application of computer software and hardware. The analysis and exploration of smart media hardware and software technology are the foundations of smart media studies. The smart media technologies that are currently widely researched and applied refer to media technologies featuring AI, which primarily include drones, the IoT, sensors, robot reporters, big data and cloud computing.

AI is the foundation and the feature of smart media communication. Back in 1950, Alan Turing already proposed the concept “mechanical intelligence” in his paper *Computing Machinery and Intelligence*, and it was regarded as the harbinger of AI research. In fact, as a branch of computer science, the objective of early AI research was to explore and produce smart machines that responses intellectually in ways similar to human, which included robots, speech recognition, image recognition and natural-language processing. Today, despite the controversies that exist in the conceptual understanding and application of AI in the academic and business circles, it is undeniable the field has achieved marked progress as technology advances and human beings continue to explore the field. AI is not simply a key subject in scientific research, it is also a critical technology for the exploration of the world and has progressively entered people’s daily life.

For example, drones have innovated the means of newsgathering of conventional media and are now regarded as a key tool in news reporting. First of all, drones offer unique angles of view and flexible shooting means. They capture wider images without compromising the resolution and strengthen the authenticity and objectivity of the news coverage, all the while bringing the audience powerful visual impacts and a stereoscopic audio–visual experience. Secondly, conventional aerial photography chiefly relies on helicopters, which come with high costs and risks, and the noise of helicopters also seriously interfere with the quality of the news coverage. In contrast, drones are light and portable, cost less and easy to operate and can transmit images in real time, thus greatly enhancing the efficiency of news coverage. Furthermore, the use of drones effectively reduces the safety hazards of the news industry and

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18 Turing (1950).
plays a tremendous role in enhancing reporting efficiency and staff mobility. Classic examples of the application of drones in media coverage included unexpected news events such as the sinking of the Oriental Star, Tianjin explosions and Shenzhen landslide. It is worth noting that the introduction of drones in news reporting has subtly stretched the “borders” of news reporting, which leads to scrutinization of and reflection on the duty and function of news media in public events amid new technologies (Fig. 1.16).

As technology continues to progress, drones are not only charged with the key tasks of the media industry, their contributions to the protection of public lives and safety cannot be left unrecognized. In the fight against the COVID-19 pandemic, the SF Fangzhou unmanned aerial vehicles delivered up to 10 kg of epidemic-prevention materials covering up to 18 km to multiple locations, including Wuhan Jinyintan Hospital. Meanwhile, DJI provided the emergency solution for body-temperature measurement using drones, whereby a cotton bud was placed within the field of vision of a thermographic camera for temperature reference, and a forehead thermometer was used to calibrate the detected temperature of the drone before measuring the body temperature. The application of a series of drone technology effectively reduced interpersonal contact, including the police drones with cameras and speakers and the tethered drones with high-power zoom cameras with 24-hour flight time, thermal cameras and flashlights. In addition to ensuring the effective communication of information while reducing the infection rate, the technology further expanded the coverage of communication, contributing tremendously to the pandemic prevention and control, both at home and abroad.

As a media technology that connects man and everything, the IoT may maximally connect everything in the world and push the “extension of man” to the extreme. In the age of the IoT, sensors, as the “antennae”, may reach all corners of society and are extensively applied to the construction of smart infrastructure. Above all else, sensors include terminals that are close to personal living, including smart homes, smart medical care and wearables. They are able to perceive and record data of human physical environments and behaviour, which they use to provide users with smarter services (Fig. 1.17).
As the basic vessels of the IoT, sensors play the role of physical terminals in AI application, and they include smart homes, smart medical care and wearables that are close to individuals. In addition to being able to perceive the needs and expectations of individual living, they may record data during actual operations, including the behaviour trajectory and physical indices of individuals. Sensor journalism refers to the use of sensors to collect data and information, which are analysed, reorganized and integrated into news coverage to complete the “story-telling process” of the news-production model. Meanwhile, to a certain extent, it expands and diversifies information sources, particularly when certain public news events take place, sensors may optimize the coverage effects through data processing and calculations. In an IoT society, a considerable number of companies continuously improve their related technologies through the research, design and application of sensor technology, which allow them to grasp user data. The control of sensor technology allows private tech companies to gradually advance towards key fields of news creation.

The research and application of robot reporters symbolize a decentralized writing system that combines man and machines and has diverse subjects, which is slowly becoming the key form during the process of news production. Wordsmith of the Associated Press has produced over 1 billion articles and news reports in 2014, which equated to 2,000 articles per second on average. Meanwhile, the Blossom Bot of the *New York Times* predicts the content with promotional effects on social media and helps editors pick the most suitable articles and content accordingly. It may even independently create headings and extract copy and find corresponding images. In China, Xinhua News Agency’s “Kuai Bi Xiao Xin”, Tencent’s Dreamwriter or Toutiao.com’s AI sports-news reporter Zhang Xiaoming, who debuted during Rio 2016, are widely recognized by both the academic and business circles. Although robot reporters are still in the initial stage of news development, they show exceptionally promising ability in the in-depth excavation and systematic processing of social-life data (Fig. 1.18).

Technologies such as big data and cloud computing are widely applied to information acquisition and distribution. Take China for example, helped by web crawlers, smart technology captures information across the Internet and easily acquires portals with massive amounts of traffic. Smart newsgathering platforms such as Toutiao.com have demonstrated remarkable communication effects that may not be overlooked, which put conventional news media to shame. Meanwhile, big data and cloud computing may understand the user needs and interests by analysing user clicks and
1.2 What Is Smart Media?

Fig. 1.18 Wordsmith of the Associated Press (Source: https://www.lexically.net/wordsmith/)

As a new, key driving force behind global scientific and technological revolution and industrial transformation, AI has reached a stage whereby it may enter industry and production to serve man. It will also become the new production forces when applied to fields such as self-driving, security, health and medicine, finance, retail, entertainment, AR and VR, which will inspire new industries, business formats and models, as it becomes one of the key drivers of the Fourth Industrial Revolution. Human society is entering a whole-new era driven by AI at top speed. The empowerment brought about by new technology will not only further liberate human bodies temporally and spatially, the spirit and creativity will also be set free and given tangible forms that subtly transforms the communication ecology and living environment, profoundly reshaping our existence and social status.

1.2.2 Communication Becomes Intelligent

Against the background of the revolution of intelligent technology, technology-driven media communication also follows the law of becoming intelligent. From the traditional media represented by radio and television to the emerging network media represented by social media, the intelligent process is constantly evolving. In recent years with the rapid development of artificial intelligence (AI) technology, intelligence media have gradually ridden on the waves of the era of “Zero-point intelligent media”. Against this background, future images generated and developing relying
on intelligent media technology has attracted more attention. Technology, communication, industry and so on have become the key to interpreting future images. On the definition of “intelligent media”, there is no common opinion at present. There are many angles to understand this concept. The two most common angles are technology and users.

From the perspective of technology, many scholars believe that intelligent media consist of the media, artificial intelligence, information technology, data and so on. From the perspective of users, a common view is to regard intelligent media as comprehensive media meeting the needs of users. They can identify preferences of users intelligently, so as to provide users with superior experience in terms of service and information. On this basis, some domestic scholars have proposed the concept of “intelligent media”, namely “user-centered”, pursuing satisfaction from users. The media industry, through the application of intelligent technology, makes the media system gradually similar to human perception and memory, thinking ability and learning ability, as well as self-adaptive ability and behavioural decision-making ability. The result of media intelligence is to make the definition of intelligent media. Intelligent media integrate user demands with intelligent media technology and regard intelligent media as the products of media intelligence. Intelligent media rely on media technologies characterized by artificial intelligence, mainly including sensors, virtual reality, IoT, big data, cloud computing, human–computer interaction and the like. The artificial intelligence features of these technologies are embodied by the simulation of human capabilities on the one hand, and the strengthening and expansion of human capabilities on the other hand. At the level of user experience, intelligent media can not only understand the user demands, but also meet user demands and, with deep learning ability, provide users with the most appropriate services.

Intelligence is also affecting every aspect of radio and television media. In every process of radio and television news collection, integration and distribution, we can see the logics of intelligent technology. From central kitchen operation to robot writing, and then to intelligent and personalized push, from AR anchor of news programs to VR scene construction of entertainment programs, in all fields of the production, broadcasting and distribution of radio and television programs, an intelligent information ecosystem is being constructed.

Now, domestic media have also seen the inevitability of intelligent radio and television. In the coverage of a series of major events including the “two sessions” in recent years, CCTV and many other media have tried the intelligent production and communication in the “central kitchen” mode, which has greatly improved the operation efficiency of the media.

Sensor data acquisition, AI integration and writing, customized and personalized push, and so on, are all in-depth application of intelligent technology in radio and television media. Media intelligence is more than just writing press releases with intelligent software; it also means to use artificial intelligence technology to analyse user data and audience emotions, and even create an intelligent information ecosystem. For example, BBC uses face recognition technology to identify audience emotions. Only by recording the viewer’s facial expressions with a desktop camera,
it is possible to analyse which contents have triggered the user’s emotion. It is also possible to explore cross-platform TV audience and analyse TV programs with AI technology.

Besides, there are the development and application of chat robots and a series of innovations to enhance audience viscosity, which have been new attempts for radio and television to combine with intelligent technology. At present, intelligent technologies are not only widely used in traditional media such as radio and television, but also more integrated with online social media. As for the information production of intelligent social media, there are not only intelligent writing and content auditing robots which free people from content management, but also AI technology application in the processing and identification of video and image information. For example, Facebook is committed to developing related technologies of recognizing languages of characters in videos automatically generating subtitles and marking the characters according to the data like costumes, figure, and hairstyle, and so on to facilitate the user retrieval in the future.

Furthermore, the information recognition and processing technologies, such as image vision technology, natural language processing (NLP) and artificial audio intelligence have greatly improved the information production efficiency of social media. And during information communication, precise and personalized information push based on the user profile technology is widely used, greatly enhancing the accuracy and validity of information communication. For example, Facebook assigns all such tasks as edition, recommendation and ranking of hot topics to machine algorithms based on the number of articles and posts on the topic, while Weibo, based on its hundreds of millions of users, hundreds of billions of relations and nearly a trillion contents, depicts a map of Chinese netizens.

In terms of the information reception of the audience, chat robots with voice functions make social media more “considerate” and create a new mode of human–computer interaction. In addition, the retrieval and analysis of audience data can also be accomplished with intelligent technologies to help the backstage better understand and predict the psychological preferences, selecting intents and behavioural modes of the audience. Besides Quartz, a digital business news website, has launched a news push notification client in a man–machine dialogue mode. It can recommend personalized news to readers with a chatty tone. The interactive process is completely done by machine algorithms. According to relevant surveys, this kind of news pushed in chatty tone has indeed greatly improved the user viscosity and provided a brand-new possibility for both the news media and the social media.

Of course, in social media, an important proposition based on interpersonal network relations, the demand for intelligence is increasing day by day. AI and big data will broaden the weakened ties network of users with various technologies, including algorithms. In whether recommendations to related contents for related users with various profiles and labels, or intelligent analysis and deep learning of user behaviour and other information with AI technology to assist interpersonal communication, we can see more and more intelligent social media catering to different social demands.
However, from radio and TV to social media, although media communication is becoming more and more intelligent, the restraints it brings to people are gradually threatening our social intercourse and daily life. Will the cleverness of machines magnify human’s laziness? Will passively receiving push notification impair the initiative and creativity of the human brain? It is undeniable that the intelligent evolution of media communication is truly another leap in the process of communication. However, we also need to further think about the shadow behind it.

1.3 Enter the Era of Smart Media Communication

Previously, we mainly take communication technology as the main thread and from the changes in media forms to the evolution of communication thoughts, it gradually cast their eyes on intelligent media communication with intelligent technology as core driving force.

In general, the history of the exploration of artificial intelligence can be simply summarized as an era when noise and desire, frustration and disappointment alternate. As the most revolutionary technologies in the era of electronic communication, intelligent media and future image lead the development direction of future media. The “message” and social vision created by these core technologies are becoming clearer and clearer. Looking back on the history of changes in human communication technologies, after oral communication, written communication and printing communication, in the age of electronic communication, the intelligent media integrate the advantages of the existing language, text, visual images, and so on to innovatively create media features more suitable for the demands of human development, making McLuhan’s prediction of “infinite extension of human consciousness and senses, integration of virtuality and reality”.

Known as the “fourth industrial revolution”, the revolution of intelligent media technology is pouring into the media and social life in an all-round way. Traditional media, in the tide of intelligence, are looking for cooperation with intelligent technology and their own transformation towards intelligent to build an intelligent information ecosystem in various fields such as production, broadcasting and distribution. New media, on the other hand, are taking the opportunity of intelligent communication, relying on their own network foundation and communication advantages, supported by core technologies, to achieve functional extension and structural breakthrough.

In the era of intelligent media communication, not only has the media forms changed subversively, but also the communication system has undergone unprecedented changes. In the future, intelligent media will build a huge communication community, in which each individual will have the media attribute of personalized characteristics and become both a producer of media content and a participant in the communication process, as well as the owner of communication rights.
Today, intelligent media and future image technologies are gradually popularized, and are more closely connected with people. If you’re careful enough, it is not difficult to find tracks of intelligent media communication everywhere in our life. The increasingly popular VR games, the code scanning operation we use every day, the “face recognition” we use when turning on our mobile phones and computers, and so on, intelligent media and future image are slowly penetrating people’s daily life. In the future, intelligent media and future image communication will be applied to various industrial systems, such as game, film and TV design, manufacturing, retail, medicine, education and art. Specifically speaking, application of intelligent media technologies to fields like design and manufacturing enables users to perform simulated assembly operations at lower cost, thus not only saving the expenditure, but also significantly improving the design efficiency. In the retail industry, the combination of future image with marketing can realize immersive shopping experiences, such as AR viewing of houses and cars, and AR fitting, which promotes the development of e-commerce. Intelligent media can also be applied to medical treatment, educational, arts and other industries. For example, surgical simulation, simulated treatment and remote treatment in the medical field, teaching and experiment simulation in the education field. Moreover, AR, VR and holography are already shining brilliantly on various stage of art. The development of future image is just in the ascendant. With the gradual maturity of the virtual reality technology, the promotion and application of various industries are also accelerating.

As for academic research, in recent years domestic research on intelligent media mainly focuses on the following angles:

First, caring intelligent media from the perspective of media convergence. Many scholars believe that the process of media convergence will not end with the integration of the subsystems of the media industry. On the contrary, the process of all media becoming digital and networked is only the beginning of media convergence to a deeper level. It symbolizes that the process of media convergence has reached a higher stage of development, namely the age of cross-border integration of media and intelligent communication driven by “Internet plus” and IoT technology system is coming. At that time, intelligent media and human intelligence will develop in harmony, which will bring subversive changes to the media industry, and then bring profound impact on the whole society.

Secondly, discussing the essence and current situation of media intelligence. The research from this angle pays more attention to the analysis of intelligent media from the theoretical perspective, which mainly starts from two dimensions, studying theory orientation and analysing the hierarchy, to classify research topics of intelligent media into four categories, respectively, the social-constructionist macro study adopting the paradigms of political economy, the techno-centrist macro study adopting the research paradigms of new media, the techno-centrist macro study adopting cognitive psychology paradigms and social-constructionist micro study adopting the paradigms of scientific anthropology. At last they predicted that the social constructionist micro study adopting the paradigms of scientific anthropology would become the mainstream of future research.
Thirdly, looking into the future development trend of intelligent media and warning about the risks and cybersecurity of artificial intelligence, further thinking is on how intelligent technology has reshaped the boundary between the real and the virtual world, and how to examine the relationship between people’s subjective world and the external objective world. Thus, these questions have already been the key matters for us to jointly consider for academic research and the practical application in the new stage of the development of intelligent media.

In general, with the vigorous development of new technologies such as big data, AI, IoT and cloud technology, the existing communication forms and patterns are showing such characteristics as everything is media-related, human–machine integration and self-evolution. The age of intelligent media has taken shape, and next, I’ll take you to more detailed and in-depth discussions on relevant phenomena and specific cases of the age of intelligent media, so as to gradually build a relatively complete idea about intelligent media.