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A Comparative Study of Actor-Network Theory and Media Bias Theory on the Concept of Materiality in Communication Studies

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Abstract:
The relationship between technology and society has always been a topic of focus in communication studies. Both technological determinism and social determinism categorize the relationship between technology and society as a simple linear cause and effect, and do not pay attention to the practical process of the media in communication, and lack of consideration of the technological orientation of the media. With the media technology on the social life of the "deep penetration", the study of the media once again returned to the field of vision of the academic community, in this regard, it is necessary to introduce new concepts and theoretical systems to analyze the technological changes and their derivative consequences of the Science and Technology Research (STS) has entered the field of vision of journalism and communication researchers. As one of the three major schools of communication, the media environment school, with its media bias theory constantly focusing on the shaping role of media in human society, had a brief encounter with STS, but confined to its doctrinal framework, its focus ultimately remained on the social dimension,and the path of the medium itself in constructing social connectivity was not presented in its entirety. The comparison of these 2 theories: So it tells us something about managing tech-society stuff in our digital times.

Keywords:
Actor-Network Theory,Media Bias,Digitalization,Media materiality,Platform Studies

1 Introduction

In 2023, the use of ChatGPT technology caused a revolution in the journalism. Also led to thinking about the media tech and society, some said that technology is beneficial to society. Others think it's because of society needing the innovation. But it ignores the nature of media technology itself. They can't explain how the media technology works in our society.

From this, we have some reflections on what exactly happens to media technology as it becomes part of the social world? How do different kinds of media materials impact information transmission? And in the digital age, how can we appropriately deal with the relationship between technology and society? In order to answer such questions, before anything else, let's briefly introduce one important notion: The materiality of media.

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Media ecology and science & technology studies (STS) have all talked about it. The first one thinks studying media bias will uncover how media materiality forms civilizations. Its representative ones are Innis and McLuhan. The later believes it's like humans,technology is also a node on the network. They form together a steady communcation sytem. And it is exemplified by, for example Latour's ANT. Though these two schools have some things in common, they haven't carried on theoretical dialogue. Because it belongs to a different discipline of knowledge.

Compare the media bias theory and st s, it is about the same and different with each other to understand the material of the media In order to understand the deeply mediatized society, therefore it can give a better insight.

2 Literature Review

2.1 A review of research on Actor-Network theory

In the 1970s and 1980s, it was first proposed by scholarsthe Paris School,including Latour,Callon,Law. It is a sociological theory that bridges the gap between natural science and literature. In his opinion, scientific and sociological accounts of the world are always vague.Boundary lines separating the social from the natural are difficult to determine. This theory states that Science and Technology can be no longer separated from the society. Its three main ideas are Actor,Mediator,Network.According to this theory, society consists of various connections between numerous heterogeneous elements.

Actor-Network theory has two types of actors: human actors and non-human actors. An actor means making some differences, affecting other things. It could be cultural customs, natural places, social relationships, thoughts, science and technology, and instrument. Also it can be classified as major and others. Major is the one who plays a main role in this network. And an actor isn't simply an intermediary. An intermediary does some special job just by having a certain place. Rather an actor is a translator, one who makes differences. The translator is every actor. The translator is central for the construction of an Actor Network. It alters it, distorts it and changes it. There are four basic steps in the process: Problematization, Interessement, Enrollment and Mobilization. During problematization stage key actors sets OPPs(ObligatoryPassagePoints).This defines what kind of obstacle each individual face and also how muchthey benefit. This is followed by interessement and enrollment which enables all actorto accept the interest claims made by key actors. Then they build relationshipand make network. During Mobilization stage key actors join their network asone. It maintains stability in the actor-network.

Scholars both at home and abroad have offered interpretations of ANT. Also they extend it in another area. This means is there relationship with any other research field. Actor -Network Theory was studied by Wang Zengpeng(2012) for its background. He believes it has gotten past those problems in social research. Dai Yuchen (2019) also thinks that Actor-Network Theory is related to studying the media. And he talked about how media research will be in the future with Actor-Network Theory.Alcadeipani (2010) also said it was a reflective one. Helping people to think about what kind of organizations they are, and how they work politically. Braga (2018) thinks this idea allows for a better grasp on the inner workings between consumption & production.

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In summary, ANT is very applicable in academia. And use it to look at how relationships between various parties are built.

2.2 A review of the Media Ecology School

Media ecology is one of the main schools in communication studies. It appeared during the 1930s and became increasingly developed by the 1960s. It is mainly about the effect of the media on people themselves. And looks at the influence of media on society and culture.

Marshall McLuhan first talked about Media Ecology in his personal letters. But it wasn't until the 1960's that it was given public voice by Neil Postman. During which time also Neil Postman created the very first Media Ecology program at NYU. And he founded its Ph.D. program there. He thinks Media Ecology mainly looks at how media affect our thoughts and feelings, specifically, how people make judgments by using different media. It also studies how media influence humans' actions. So it is clear that human beings don't use the media in an objective manner; instead, we utilize media with certain assumptions.

Media ecology school is growing up day by day: Lewis Mumford, Benjamin Lee Whorf, Susanne K. Langer and others are pioneers of media ecology. It gave some new views on media ecology from various standpoints. And also the influence of man made environment on human being, civilization. And the forms and structures of symbolic system.

Harold Adams Innis and Marshall McLuhan were representatives of the first generation in this school. Innis put forward the concept of media bias, which constitutes the main idea of the Media Ecology School. He believed that every medium has its own bias. Based on Innis's theory, McLuhan put forward the concept of sensory bias of media. He said the well-known phrase: "the medium is the extension of man". He said every medium is an extension of our human sense organs.

Neil Postman was one of the leading scholars from the 2nd generation of Media Ecologists. And he put out there that the medium is a metaphore. Also if people mythologize tech too much he thinks we'll end up being controlled by it. Postman was always wary of the domination by technology over people. He was always thinking like a person. Due to his very rational ideas, he rejected all sorts of entertainment from the media. And he was quite negative about electronic media in general too.

Paul Levinsion and Joshua Meyrowitz are the 3rd generation leaders of the Media Ecology School. Levinson's thoughts are somewhat like what McLuhan said about media technology. He holds to a man-oriented philosophy. He thinks that it's not really completely dominant for Technology when there is a relationship between tech and us. Human initiative also plays an important part. Meyrowitz put forward the Media Situations Theory on the basis of previous theories. He feels that a medias constructed informational world is equally real as scenes in life. And this theory also has some guiding meanings in the era of context.

2.3 Research question

In a nutshell, there are lots of good results on the Actor-Network Theory and Mediecal Ecology School. It can offer some references for my study. But the present studies also have some shortcomings.

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First, they've been in different places academically for a long time. They don't have systematic dialogue or comparison. It's also hard for it to explain today's media in a complementary way. Secondly, it is tending to value application more than tracing its origin. When a lot of researches use the theory□they ignore that this is a specific situation where theory was created. Third, at present, there is no combination between digital media and reality. It also restrains the growth of theory, and makes it hard for us to grasp new things.

So this paper will review these two theories systematically and try to find out the difference between them. Meanwhile it analyze the strengths of each theory within our current digital media enviroment and asks what are the strenghts. The research question for this paper is:

RQ1: Are there similarities between the views of Media Ecology School and STS theory?

RQ2: Can we use which theory to interpret how new technology affects us and society in the digital era?

3 Method

3.1 Literature review method

The literature review method is commonly seen in academic research. It's about reading and analyzing all the academic books out there. First, researchers find some relevant books and articles in journals and so on, and then study them carefully. I just want to know about the growth of a certain area. And it helps identify the main theories and ideas. This is a good start for my future studies. So that it is based on knowledge already out there. So the literature review is supporting us on our academic inquiry.

3.2 Comparative method

Comparative method is a usual way to do academic work. That is to look at two or more things together. Researcher sees the same and different things. It can make us know more about every person. And it also shows things and relationships that we may not have noticed. In particular it can be useful for communication studies. Scholars are enabled to compare different theories, medias, cultures and so on. It has contributed to the expansion of theoretical knowledge.

4 The Materiality of Media: The Encounter Between Media Ecology and STS

4.1 A distinctive third path: Media Ecology

Media are very important vehicles through which humans pass along information, in short it's a sign/material unity. Lievrouw L. gives a definition of materiality: Technological devices are objective things with certain physical characteristics. It's thus possible for technology to realize certain goals under given circumstances. Currently it is believed that materiality was one of the basic properties of the media. But after mass media were born, people seldom paid attention to the fact that media had a body or material aspect.

The empirical school, mainly based in the United States, focuses on media effects research. For example,

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Lippmann W. studied newspapers and public opinion. Bernays E. researched propaganda reports of various countries during the war. Blumer H. examined the influence of films on children. Lazarsfeld P. investigated how mass media affect elections. Their studies always focus on how content influences the attitudes, ideas and behaviors of the audience. In their view, texts or content composed of signs are the key to studying communication effects. Material technology is only a tool for carrying content.

The critical school examines the influence of media content on people. They also study the political and economic interests behind content production. However, they similarly overlook the material dimension. The Frankfurt School, represented by Horkheimer M. and Adorno T., starts from political economy. It regards texts as standardized products of media production. It reveals how capitalism controls public ideas. Cultural studies, founded by scholars such as Williams R. and Hall S., also criticizes the power relations in the media system through text analysis.

The empirical school and the critical school place people and media technology in opposition. The former regards media as a tool. The latter focuses on the alienation of human beings caused by media technology. In contrast, the Media Ecology School holds a more balanced attitude. It believes that technology is not separate from or opposite to humans. Technology is an extension of human beings. Therefore, it will eventually exist in harmony with humanity.

By sorting out the views of scholars from different generations of the Media Ecology School, we can see that media bias is one of the important propositions in its research. In his early work Empire and Communications, Innis put forward the idea of time and space bias. He argued that media are either time-biased or space-biased. Media play a vital role in shaping human civilization and finally contribute to the formation of empires. On this basis, McLuhan further developed the theory. He shifted the focus from time and space to human perception and believed that different media have different sensory biases. The development of the Internet has balanced multiple human senses. Postman focused on the influence of electronic media on childhood. In The Disappearance of Childhood, he pointed out that electronic media greatly affect childhood. The boundary of knowledge reception between adults and children has gradually blurred. The popularity of precocity makes childhood disappear. As a latest representative of the Media Ecology School, Meyrowitz continued to analyze how media influence people's daily social life in detail. He pointed out that media have front-region bias and back-region bias.

It is evident that the media ecology school places media at a critical juncture in social development. Its primary focus is the study of the biases inherent in different media.

4.2 The social shaping of technology: A core issue of STS

Science and Technology Studies (STS) emerged in the 1970s. It employs humanities and social science methods to explain the generation and development of science and technology. Its main research content concerns how science and technology are introduced into society. Actor-Network-Theory (ANT) is one of its intellectual branches. ANT originated from the science and technology studies tradition in the 1980s. It pays particular attention to how technology, as a thing, enters the so-called social domain (which ANT terms the "network"). It also examines how technology "stabilizes" social connections.

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Its representative figure, Bruno Latour, argues that ANT opposes both “technological determinism” and “technological reflectionism.” Technological determinism holds that technology determines changes in the social domain. Technological reflectionism holds that technology is merely a reflection of broader social trends. The research focus of ANT is the “social shaping of technology”. To understand the social shaping of technology is to examine the dynamic associations between technology and its practical networks.

In response to this, Latour adopts a distinctive scientific analytical approach. He “de-essentializes” all actors, including human actors and non-human actors such as technologies and objects. Previous studies considered the cultural meanings and power attributes behind the main actors. For example, the critical school believed that the invention and popularity of television resulted from the efforts of the middle class. A television set was too expensive for low-income families. Most of them could only get the latest information from the outside world through radios. The emergence of television as a new media was quite subversive at that time. Its communication form of combining sound and images soon became popular among people. However, if we adopt Latour’s analytical approach, we should regard television as an actor within the network. In other words, we should ignore the power relations and productivity level behind this new media technology.We can treat it as “quasi-objects”, which are social actors containing possibilities of action themselves.Then, in the practical network, this quasi-object connects with other actors. This is what Latour describes as “any element that makes the world turn towards itself, that makes other elements depend on it, and that translates their will into the language of its own”. It is just like what Latour described in his works: any element that gathers space around itself, makes other relevant elements depend on itself, and translates their will into its own language (Callon & Latour, 1981: 286).This is not conducive to forming complementarity when explaining contemporary media phenomena.

Consider a typical media example. A stairway handrail is simply the “materialization” of the human action of protecting someone from a fall. This means the object itself must be seen as an acting thing. It is in “association” with human action. As Latour states: “By our definition, a tool is an actor, or more precisely, it participates in the action sequences waiting to be configured”.

4.3 The ANT lineage embedded in Media Bias Theory

Latour once stated that his theoretical research pursues a form of “pragmatogony”. This means tracing the “genesis of things” within a diachronic dimension. Scholar Lin Wen-kuan used the term “ontology-in-practice” to summarize Latour’s ontological commitment. This concept follows the same line of thought. Things and their effects must be understood within the practical network in which they are situated. Lin Wenang's viewpoints are very similar to the main topics of STS in terms of its academic views. So I am taking into account the opinions stated by LIN WENWANG on Media Ecology:Evolution of Ideas and diversity. He believes that the three fundamental theoretical claims of the Media Ecology school which he has investigated can be read as the view of media bias held by the Media Ecology School.

First of all, communication media aren’t impartial devices From the perspective of media ecology,each medium has its own material traits. Also, it has unique symbol meanings: These features determine what gets said and how it gets said, so media research has to look at content as well as at the medium itself in its effect on us.

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Second, Each medium has its own materiality. Because different media use different symbols in the process of transmitting information. This gives rise to their different biases. And economist Thorstein Veblen talked about bias as part of institutional economics. In this concept was later used by Innis and taken into the field of communication. Ininis suggested the Time-Space Bias Theory. It is a theory about the development of media and society. He believed that there are two kinds of media: Time-biased media is lasting but clunky. They're good for passing along knowledge through the ages vertically like stone and parchment: Space-biased media is light, it's portable. And knowledge has a horizontal exchange of sort, like on papyrus. McLuhan puts forth this thought: He put forward the idea that medium was the extension of man. He believed that media technology affects human perception.

Third, Media's impact on society is varied.Communication plays a vital role in human existence.Media communicates with all aspects of life such as politics,economy,culture etc.Media's effects on culture are very strong too.People will perceive the same culture differently when using various forms of media.Media ecology has studied this problem and has given more understanding of the social implications of new technology.

Summing it all up:Media Ecology is much like ANT. Both theory believe that Media is no neutral instrument. Rather, they have different biases based on the different sets of symbols they use. In return, it has an influence on every aspect of society. Communication Research should take note of the materiality of media.

In the process of communicating according to ANT theory, media and people are also individuals. They exist in a web either end could be seen as something that needs to be explained and not as a cause which does not need any explanation, it focuses on what the media actually does instead of the outcome being shown. Nick couldry has likewise taken exception at former, fixed. He proposed we think of media as practice instead of as symbolic texts, products of social structure. So, it becomes an investigation in society based on the "theory of practice". To understand a piece of tech, you can't just see it as being a "thing". It's also an important symbol in our culture.

The emergence of a media technology is inseparable from its specific historical context. It embodies the level of productivity at that time. When it is widely applied in social production and practice, its material attributes recede, and its cultural attributes become prominent. However, focusing exclusively on either end leads to the trap of binary opposition. It prevents a comprehensive, multi-dimensional understanding of the true significance of a media technology's emergence. Its potential value is also greatly diminished. This is also the reason why media bias theory has not fully encountered STS. Although it attends to the influence of the material dimension of media, its ultimate focus is on the development and shaping of human civilization.

Perhaps the synchronic research of ANT offers some inspiration for mediatization studies. It helps us recognize that "media-related social change operates in a more complex way—namely, the interplay between emerging new media and the accompanying media practices is interwoven together".

5 Reflections on the Digital Age: Which Theoretical Approach Should Be Adopted for New Technologies?

The development of digital technology has reformed the production process of journalism. It has also cre-

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ated new forms of human social civilization. When media technology profoundly influences human society, it is urgent for humans to examine new technologies. This paper attempts to find answers from media bias theory and STS theory.

5.1 The unique bias of digital media technology

The emergence of digital media technology has changed human literacy practices. Human beings have entered an era where virtuality and reality are intertwined. Digital media technologies are characterized by visualization and interactivity. Media bias theory holds that media influence both human senses and the shaping of social civilization. Likewise,digital media technology also affects how people perceive information.

First, digital media comprehensively extend human hearing and perception.McLuhan also argued that

"Any technology is an extension of our physical and nervous system to increase our power and speed."They are important carriers for human beings to cognize new things through multiple senses. Sometimes, humans also cognize new things based on past experience. In the past, when people used traditional media, sensation and perception functioned separately. However, digital media are different. By extending sensation and perception at the same time, they enable a form of "real" perception in virtual environments. Here, when we see a bullet flying toward us, our sensory organs rapidly transmit danger signals to the brain. The brain then directs the body to react by dodging.

Second, digital media technology possesses both time bias and space bias.It is generally regarded as "time-space"bias media.It breaks through the traditional limitations of time and space. By extending the human perceptual system, it brings people into the virtual world.However,Innis simply divided media into "time-biased" and "space-biased".

Third, digital media redefines the concepts of "cool media" and "hot media". McLuhan first introduced these concepts in Understanding Media: The Extensions of Man. However, he did not provide a clear academic definition of the two concepts. In his work, hot media require little sensory involvement in information transmission. By contrast, cool media require the engagement of multiple senses for information decoding.

5.2 Platform studies: digital media research from an STS perspective

STS theory holds that the materiality of media is the key to communication research. This concept was recognized in early studies of digital media technology. In 1936, the Turing machine was born. Kittler argues that new media signify the beginning of the digital media era. Nowdays,the Internet age has arrived, and digital media are continuously being renewed. The concept of the platform has emerged accordingly. It emphasizes a comprehensive system that includes hardware. It also refers to new business models and corporate entities based on Web 2.0.

In recent years, with the rapid development of major platforms, research on digital media platforms has become increasingly popular. The construction of its knowledge map also revolves around the social shaping of technology. Couldry once predicted the importance of ANT for communication research. He stated that "the separation of ANT from media sociology in the 1990s was very regrettable." ANT is an important theoretical toolbox for understanding the social influence of media. So, what can ANT bring to platform studies in the

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digital age? This paper argues that ANT offers inspiration for future platform studies on at least three levels:

First, a platform is a unity of material technology and business model. The techno-economic logic constitutes the most fundamental issue in platform studies. As large internet companies expand globally, platforms leverage free services to collect data and monetize it. This techno-commercial logic demonstrates strong vitality.

Second, this commercial force embeds itself within and reshapes various social and cultural domains. Therefore, the social and cultural shaping of platforms becomes the second major issue.

Finally, with the continuous expansion of platforms, they have penetrated nearly all areas. These areas include information exchange, social networks, food, shopping, transportation, and payment. Platforms have become infrastructure for social operation and daily life. Consequently, platform studies share common concerns with infrastructure studies, a subfield of STS. The infrastructuralization of platforms has thus emerged as a cutting-edge topic.

The three major topics outlined above take the materiality of communication and media as their logical starting point. They move from technology and economics to culture, society, and daily life. They clearly trace the trajectory of digital technical objects as they continuously expand and deeply integrate with society.

Mainstream functionalist research has consistently viewed media as playing an instrumental role. ANT places particular emphasis on the idea that artifacts are not simply objective or neutral material substances. Instead, they are material configurations that embody various absences and shape our social interactions. In this sense, communication media should be regarded as "actors that build networks."

We have now entered an era of technology. The deep interembedding of human civilization and digital civilization drives progress and development. The connection between digital media and Chinese society has become a cutting-edge topic in communication and media research. How to situate ourselves within specific "mediatized situations" and connect media with media practices is the direction we should consider. In the words of ANT, we need to trace the trajectories and deployments, paths and traces of all actors, including media as things and human actors. In other words, we must follow the actors themselves.

Perhaps focusing on the practical pathways of media technology can do more than just supplement the lack of a materiality orientation within our discipline in China. It can also provide fresh perspectives and feasible methods for related research in our country.

6 Conclusion

In the present era where everything is media and deep mediatization prevails, media practices are permeating and influencing social production and daily life in all dimensions. How to properly handle the relationship between media and society has become a heated topic in academic circles. Whether it is the tendency toward "media practice" research emerging in the early media ecology school or the introduction of STS theory into contemporary communication and journalism studies, both remind us to pay attention to the materiality of media and to recognize its "technological autonomy" within social networks. Today, media no longer repre-

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sent reality as purely neutral instrumental entities. Instead, they are agential assemblages with certain biases. Media construct reality through the practice of representation.

In response, journalism researchers should not simply apply STS theory mechanically. Specifically, on one hand, they need to continue understanding the development of STS in other social science fields. On the other hand, they must focus on uncovering the uniqueness of applying STS theory within journalism. In short, for studying technological issues in journalism, the introduction of STS is only a starting point, not an endpoint. The evolution of journalism ahead will unfold over an extended period.

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