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Research on the Evolutionary Mechanism of Information Fog within the Context of Generative Artificial Intelligence: A Phenomenological Perspective

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Abstract: This paper takes information fog in the context of generative artificial intelligence as the research object, and explores the evolution mechanism of information fog in the context of generative artificial intelligence based on the phenomenological research paradigm and through the research method of in-depth interviews. The results show that the phenomenon of information fog in the context of generative artificial intelligence is mainly influenced by the actor, the actor object, the social context and the information medium. Specifically, the actor is the endogenous driving force of information fog generation, the social context provides external conditions for information fog generation, the behavioural object is the direct motivation of information fog generation, and the information medium strengthens the user's perception of information fog.

1. Introduction

Information fog is an important direction in the study of news communication and intelligence. Current research on information fog focuses more on the improvement of the theoretical spectrum, such as explaining its connotation, influencing factors and response. However, as a kind of information phenomenon originated from a specific media platform and dispersed by a specific public opinion atmosphere and social environment, its generation and diffusion process is not only deeply infiltrated by technological logic, but also coupled with the complex social system, so it is necessary to further explain the evolution mechanism of the information fog nowadays, when China is making progress in the field of generative artificial intelligence. It should also be noted that some scholars have already conducted preliminary research on the evolution mechanism of information fog, such as discussing the evolution mechanism of information fog based on the life cycle perspective, applying the intelligence deception theory to study the attack mechanism of information fog, and discussing the diffusion path of information fog in military conflict scenarios[1]. However, with the continuous emergence and continuous upgrading and iteration of

generative AI such as Deepseek, Smart Spectrum Clear Speech, and Doubao, it is foretold that the fermentation space of information fog will usher in further expansion. Will the evolution mechanism of information fog change in the context of generative AI, and to what extent? All of these urgently need in-depth research. Therefore, this paper takes the information fog in the context of generative artificial intelligence as the research object, based on the phenomenological research paradigm, and explores the evolution mechanism of information fog in the context of generative artificial intelligence through the method of in-depth interviews.

2. Literature Review

The concept of information fog was born early in the field of intelligence, describing the vague, uncertain, incomplete, misleading, and confusing state of the information environment.LD. Carl was an early proponent of the concept and criticised the subjective impropriety of its creators. Carl was the first to introduce the concept of information fog and criticised the subjective impropriety of its creators[2]. C. Ireton and J. Posetti have also acknowledged that information fog can easily mislead or even harm the public and, on this basis, have conducted a preliminary study on the mechanisms of information fog dissemination[3]. In Chinese studies, information fog was first used to describe the state of information in libraries where it was difficult to distinguish between truth and falsehood and to confuse the public[4]. Subsequently, Su Peng and Wang Yanfei discussed the impact of information fog on the analysis of public decision-making and its coping strategies based on the perspective of the discipline of intelligence[5]. As the digital transformation of society enters a full speed phase, some researchers have found that information fog has the potential to guide public opinion, which can be further developed into an important tool in public opinion warfare. For example, Lao Chunyan's research shows that information fog has a significant impact on public opinion during wartime[6]. It can be seen that information fog, as a special information dissemination phenomenon, not only plays a role in human cognition and decision-making at the individual level, but also has a non-negligible impact on social ecology, national security and international relations at the social and national levels.

3. Methods and Data

3.1. Methods

Phenomenology is an important research field in qualitative research, and its core concept is to analyse the essence and inner laws of specific social phenomena by observing them. Considering the applicability of phenomenological research methods in the above scenarios, this paper uses the phenomenological research paradigm to further explore the evolutionary mechanism of information fog in the context of generative artificial intelligence through phenomenal reductivity analysis, essentiality reductivity analysis and phenomenal a priori reductivity analysis.

3.2. Data Collection

In the phenomenological research paradigm, the interview method is a commonly used data collection method. Therefore, this study also used the interview method as the main means of collecting primary data. This study conducted semi-structured interviews with the interviewees, which has the advantage of ensuring the richness of the interview data obtained, but also has flexibility in the actual operation.

Before conducting the formal interviews, this study adopted a purposive sampling method and selected 20 Internet users for the pre-survey. The purpose of the pre-survey was to test the

applicability and validity of the interview outline and to ensure that the questions were clearly formulated and easy to understand. Based on the results of the pre-interviews and the feedback from the interviewees, the author revised and improved the questions that were not clearly stated and difficult to understand, and eliminated the questions that were not closely related to the research topic, and finally formed the formal interview outline.

The formal interview outline revolves around users' information use behaviour, focusing on the logic of information fog formation in the context of generative AI. In order to ensure the scientific nature of the research process, the formal interviewees selected for this study satisfy the following criteria: firstly, cognitive, representational and communicative abilities: the interviewees should have good cognitive, representational and communicative abilities, and be able to accurately and completely express their true thoughts. Second, deep user of generative AI: the interviewees should have at least 1 year of experience in using generative AI and should have used generative AI no less than 15 times per month in the last six months. Third, demographic diversity: considering that demographic factors may have an impact on the results of the study, the interviewees should have as balanced a distribution as possible in terms of age, gender, education, and geography to ensure the representativeness and generalisability of the study.

According to the research of Turpin and other scholars[7], the sample for the phenomenological study was 5-8 individuals. On the basis of the paradigm of previous studies, this paper selects 7 out of 20 pre-interview subjects as the final research sample. In the process of sorting out the interview data, this paper excludes parts of the interviews that have little relevance to this study and inconsistent responses to ensure the reliability and validity of the data.

3.3. Analysis of Interview Data

This study followed the relevant requirements of the phenomenological analysis methodology and conducted a systematic qualitative coding analysis of the raw textual data obtained. The specific analysis process includes the following steps.

First, overall grasp and preliminary reading. The researcher read through all of the raw textual materials in order to get an overall grasp of the whole picture of the phenomenon of information fog in the context of generative artificial intelligence. The purpose of this stage is to have a macroscopic understanding of the research object and to lay the foundation for subsequent detailed analyses.

Secondly, phenomenological reduction is carried out. Through abstraction and generalisation, the descriptions in the original text are converted into standardised, concise phrases. This process, known as phenomenological reduction, aims to extract the core information in the text, remove redundant content, and make the research material more concise and clear.

Next, conceptual categorisation and essential reduction are carried out. Abstract categories with similar concepts and similar themes are classified to form conceptual clusters, and specific descriptive labels are assigned to each conceptual cluster. This process is called essence reduction, which aims to reveal the essential characteristics and internal logic of phenomena through classification and labelling. For example, ‘unclear source of information’ and ‘difficult to distinguish between true and false content’ are categorised as ‘mechanisms for generating information fog’.

Finally, a priori reduction and structural refinement. Concentrate the phenomenological essence and concepts, and further refine the elements, categories and associated structures reflected in the phenomenon to complete the a priori reduction. The goal of this stage is to construct a systematic theoretical framework through comprehensive analysis to reveal the deep mechanism of information fog in the context of generative artificial intelligence. For example, the concepts of ‘unclear source of information’ and ‘difficult to distinguish between true and false content’ are

combined to form the core concept of ‘multidimensional generation mechanism of information fog’.

3.4. Theoretical Saturation Test

Theoretical saturation test is a test that indicates that the data collection has reached theoretical saturation if no new theoretical insights are generated by introducing new sample data and following the same methodology. In this study, after qualitative coding analysis of the interview data, further theoretical saturation tests were conducted to ensure the robustness and reliability of the findings. The results showed that the coding analyses of the new samples did not produce new concepts, categories and relationships, which indicates that the existing samples have been able to comprehensively cover the logic of the formation of information fog in the context of generative AI. Therefore, it can be assumed that the existing sample has reached theoretical saturation in terms of category generalisation of information fog in the context of generative AI.

4. Results

4.1. Reductive Analysis of the Information Fog Phenomenon

The main purpose of reductive analysis is to carry out a descriptive analysis of the information fog phenomenon in the context of generative artificial intelligence, so as to restore the existence and operation mode of information fog. As shown in table 1, the types of information fog mainly include false information, misinterpreted information and scrambled information. Users' perception of information fog can be divided into active and passive types. The former reads the above information types easily and will spread and forward them actively; the latter is usually cautious. It is worth noting that the interviewees' opinions on the impact of information fog generation were widely divergent. Some respondents insisted that information fog would make it difficult for audiences to identify the authenticity of information, thus affecting their judgement and decision-making; while others acquiesced to it as a reasonable social phenomenon.

Table 1: Reductive analysis of the phenomenon of information fog.

Phenomenological Reduction	Intentional Activities	Explicit Description
Type of fog	Misinformation	Generate content that looks particularly like authoritative information, but on closer inspection is actually not
	Misleading information	The meaning is easily misunderstood and ambiguous.
	Patchwork information	The content is not the same as the authoritative information, but it's not.
perception of fog	Positive	AI-generated stuff is fun, sometimes I will post it to my friends, but I don't care too much if it's reliable or not.
	Passive	Generally, I don't share unconfirmed news
perception of fog	Meaningful	The emergence of AI-formed information fog may mean that the level of information technology and intelligence has reached a high level. But, as you know, it's not that high yet. So it may be an overstage, but it will get better
	Harmful	The information fog may interfere with my knowledge and understanding of the truth

4.2. Ontogenetic Analysis of the Information Fog Phenomenon

The analysis of ontogeny is mainly to reveal the inner law and evolution mechanism of things through in-depth analysis of the phenomenon of information fog. Based on the results of the analyses in Table 2, the formation of information fog is the result of the coupling of multiple factors, which can be generally divided into four dimensions: the subject of the behaviour, the object of the behaviour, the social situation and the information media.

Table 2: Ontological analysis of the phenomenon of information fog.

Structural Themes	Structure Description	Description
Actor-object	User Emotions	I like what AI generates.
	Cognitive Bias	I watch AI-generated content carefully.
	Information Literacy	I can tell which AI-generated things are real and which are fake.
	Information Benefits	Using AI has helped me a lot.
Object of the Act	Information Quality	Sometimes the quality of AI-generated stuff is mediocre.
	Data Misinformation	Some of the AI-generated content looks logical, but it is probably fictional.
	Emotional Information	Sometimes AI-generated content is too emotional and biased.
Social Context	Social Climate	Everyone is using Deepseek, and all major media outlets are pushing it.
	Information Disorder	You can't cope with the huge amount of AI-generated content.
	Social Media	Social media and friends' sharing are important sources of AI information.
Information media	Information Push	Intelligent pushed information is sometimes more interesting, but after a long time will feel the homogeneity of the content.
	Information Filtering	AI platform will help me block some inappropriate information.

4.2.1. Actor-object Analysis

Firstly, user emotional factors. More than half of the respondents believe that an individual's emotional state affects his or her perception and judgement of information. Positive emotions can enhance users' acceptance intention and make them more inclined to recognise the content and attitude conveyed in the information. For example, Interviewee P1 mentioned, ‘AI might still be nerdy in the past, but not anymore. Like Deepseek I ordered it as soon as it was released, and it can really help me solve a lot of problems in my work.’

Second, the cognitive bias factor. Some users may be influenced by pre-existing perceptions and have misconceptions or biases about the information. Interviewee P6 said, ‘It's essentially a search engine for big numbers, so how can it produce correct content if what is uploaded at the beginning is biased?’

Third, the information literacy factor. Differences in information discernment among different users can lead to misjudgement of the authenticity of information. Another interviewee, P4, said, ‘Although it generates things that seem to make sense, sometimes it creates AI illusions that don't stand up to scrutiny. But most people do not make retrospective arguments about individual details

of it.'

Fourth, the information gain factor. Information gain incentivises users to spread unverified AIGC, thus exacerbating the spread of information fog. For example, interviewee P1 mentioned, 'I once posted a dialogue with Deepseek in my circle of friends and gained a lot of likes, I was quite happy. But then a teacher told me that some of the content in it was not accurate.'

4.2.2. Object Analysis of the Act

First, the information quality factor. Content produced by generative AI without deep thinking may be of dubious quality. Most of the interviewees reported varying content quality during their initial use of generative AI. Interviewee P1 mentioned, 'It was like "artificial retardation" when I first started using it.'

Second, the factor of misleading data. The quoted data may appear to be accurate and objective, but if improperly quoted and linked to specific events, it may have the negative effect of misleading data. Interviewee P4 stated, 'Some of the data is obviously incomplete, and some of the content is based on these incomplete data to confuse people. It may seem that the data is cited, but instead of making accuracy better, it reduces credibility'.

Third, the emotional information factor. The emotional value carried by the information increases the likelihood of emotional dissemination of the information. Some users place more value on the companion attribute of the intelligent body, with interviewee P6 stating, 'I asked my boyfriend to record the AI voice package for me, and talking with it is like talking with my boyfriend by my side.'

4.2.3. Social Context Analysis

First, the social atmosphere: the explosion of Deepseek and other intelligences has formed a social atmosphere of 'everyone is using AI', and for different motives, users induce intelligences to give answers that are in their own interests, and a large amount of mixed information provides a breeding ground for information fog. Interviewee P1 said, 'Overnight, you're using it and I'm using it, and when I saw the news report, everyone who didn't use it went and got one. There is no need to care whether the content of the information is true or false, the first to rub this heat'

Second, the information disorder factor. Information disorder mainly refers to misleading, false or harmful information that is intentionally or unintentionally disseminated in the online public domain. According to the results of the study, information disorder has become an important factor in the generation of information fog. Interviewee P3 believes that 'the AI voice of General Lei produced by netizens has reached a level where it is difficult to distinguish truth from falsehood.' In a decontextualised and relatively opaque information environment, information disorder can lead to the emergence of information fog, affecting users' cognition and decision-making.

Third, the social media factor. Social media has become an important way for online users to obtain and share information and establish social relationships. Interviewee P5 said, 'If you don't know how to use Deepseek's cue words you can go to Jitterbug and B station, there are a lot of teaching. But it is also important to look at it critically, some of the content is AI-generated and then made into a video, and you don't know if it's true or not.' It can be seen that social media, on the one hand, has become an important channel for users to improve their ability to use AI, but because the relevant regulation is still missing, it also contributes to the spread of false information and information of unknown origin.

4.2.4. Information Media Analysis

Generative AI operation logic includes information pushing and information filtering. Based on

these two mechanisms, the algorithm builds a ‘cognitive mirror’ based on personalised digital intelligences, which frames the user in a specific information flow, resulting in a single type of information and a user's cognition framed within a specific framework. As interviewee P4 stated, ‘Sometimes when you ask the AI questions from different perspectives, you do get almost the same answer.’

4.3. A priori reductive analysis of the information fog phenomenon

Under the phenomenological paradigm, this paper carries out an ontological description and reductive analysis of the information fog phenomenon. The results show that the phenomenon of information fog in the context of generative artificial intelligence is mainly affected by four levels: the subject of the behaviour, the object of the behaviour, the social context and the information medium. Based on this, this study constructs a theoretical model of the evolutionary mechanism of information fog in the context of generative AI (Figure 1), where the actor is the endogenous driving force for the generation of information fog, the social context provides the external conditions for the generation of information fog, the behavioural object is the direct motive for the generation of information fog, and the information medium strengthens the user's perception of information fog.

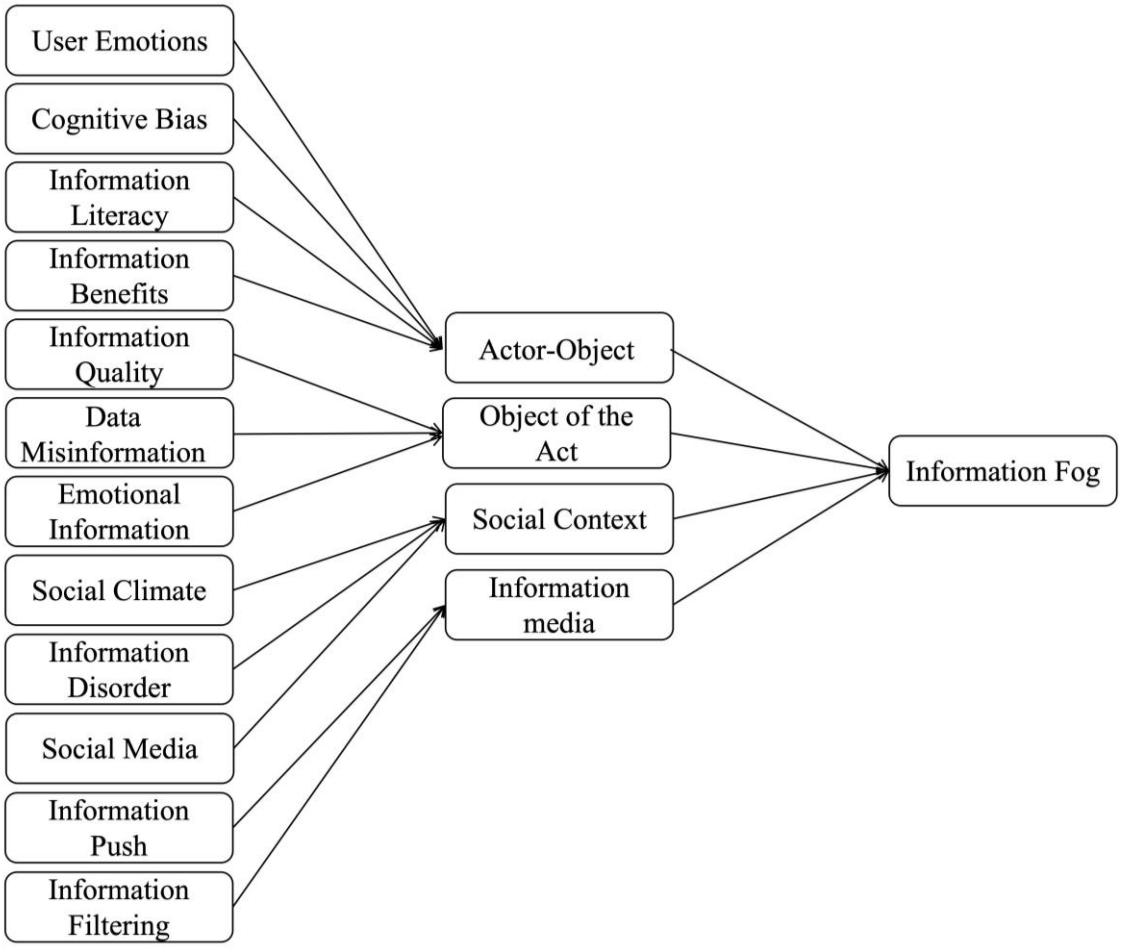

Figure 1: A Theoretical Model of the Evolutionary Mechanism of Information Fog in the Context of Generative Artificial Intelligence

5. Conclusions

Based on the phenomenological research paradigm, this paper explores the evolutionary mechanism of information fog in the context of generative artificial intelligence. The paper finds that in the context of generative artificial intelligence, the generation and evolution of information fog is the result of the mutual coupling of the actor, the actor object, the social context and the information medium, and cannot occur in isolation. The actor is the endogenous driving force for the generation of information fog, the social context provides the external conditions for the generation of information fog, the behavioural object is the direct motivation for the generation of information fog, and the information medium strengthens the user's perception of information fog. This study is intended to provide knowledge increment to explain the information ecology in the age of digital intelligence from a phenomenological perspective, and it is still necessary to deepen the human-computer collaborative governance path of information fog in the future.

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