Research on the relationship between algorithmic push and rumor propagation effect in the risk society perspective

Qi Linzi,
School of Film and Television, Nanjing University of the Arts, China
***Corresponding author E-mail: 1668008635@qq.com**

Abstract: In recent years, with the emergence of the risk society and the increasing trust in disinformation, precisive push mechanisms driven by big data have spread throughout our daily lives, which not only influences the information we receive, but also extends the spread of misinformation. This paper takes online rumor communication effect in the case of Hu Xinyu as the basis for investigation. After analyzing questionnaires and interview results, the study finds that the algorithm-based recommendation system can amplify the spread of disinformation in the context of risky society, and repetition effect and first-cause effect can intensify people's positive effect on the spreading of rumor. This study attempts to provide an effective reference for the effectiveness of information delivery of media and the whole society.
Keywords: algorithmic push; first-cause effect; repetition effect.

1 Introduction

In the context of risk society, structural changes take place in the society and the increasingly significant weight of big data personalized push in the communication process have made the phenomenon of rumor propagation more and more frequent. Currently, big data and algorithms have become important pushers to dominate the range of information content that people receive. The personalized short video recommendation system driven by algorithms recommends content based on users' characteristics, which is implicitly underlied by the logic that "who you are" determines "what is recommended for you". However, this decision-making process is carried out in a "black box".[1] Under the precise pushing mechanism of platforms such as Douyin and Toutiao, rumors appear repeatedly after precise pushing, making users convinced of the rumors. And when the counter-rumor information is sent out, users don't believe it much anymore. We observed that there seems to be a correlation between algorithm push and the effectiveness of rumor propagation. We are curious about these questions: Why do audiences believe in rumors? What are the dynamics that influence the audience's attitude toward rumors? What are the implications and lessons of this mechanism for society and media?

2 Literature Review

2.1 Algorithm Push

Algorithmic pushing has attracted researchers to do research from multiple perspectives. Domestic scholars (Specially refers to Chinese scholars, same meaning below) Hao Yu and Li Linxia found in 2017 that personalized information pushing abandons the traditional way of pushing information, setting a personalized trap for users in a targeted way through filtering and processing information.

In 2019, domestic scholars Cui Di and Wu Fang examined the basic "information notification" function of news acquisition tools from the perspective of their effectiveness, and their findings show that Toutiao enables users to acquire a relatively broad news knowledge structure (public affairs knowledge and soft news knowledge). Despite it greatly changes information distribution mechanism, Today's headlines is still a channel for people to consume news and information frequently, performing the basic function of a news product.[4] In the same year, Huang Xiaozui, a domestic scholar, based on the perspective of the constraints behind personalized information push, found that the "information cocoon" built by the personalized information push model often ignores the complexity and variability of users' own behavior. If the target audience is continuously pushed with information that is no longer needed or follows the same pattern, it will, to a certain extent, cause the audience to get bored or resist, instead of winning the love of the audience,.[3]

Wang Xianqing, a domestic scholar, conducted a more detailed study on China's socialist ideology that faces the challenge of technological alienation in 2020 based on the information dissemination effect of intelligent algorithm pushing, and his research shows that taking mainstream ideology as the value guide, intelligent algorithm technology as the engine, and human information literacy as the core to help build mainstream ideology is the right way to actively respond to the challenge of intelligent algorithm technology to mainstream ideology and accelerate the process of building network information civilization.

[2] However, these studies have examined the algorithm and information dissemination aspects, but have neglected the repetition effect and first cause effect aspects.

2.2 First-cause Effect

The first-cause effect theory, first proposed by the American psychologist Lochins in 1957, refers to the influence of the first impressions formed by both parties on future relationships, that is, the effect of "preconceptions". Although these first impressions are not always correct, they are the most distinctive and strongest, and determine the course of future interactions between the two parties. It has received a lot of attention from scholars at home and abroad, and a lot of research results have been achieved. In 2000, Guo Xiaozhao, a domestic scholar, proposed that there is a significant overall precedence effect in the process of Chinese character image pattern recognition. In 2013, Liu Xiuguang and Yang Naiding, domestic scholars, showed that when the consequences caused by an emergency event are very serious, the influence of cue emergence order on the choice of solution is not significant. However, when the consequences of the crisis are generally

severe, the influence of cue emergence order on the choice of solution is very significant, and the final choice of solution is highly consistent with the initial emergence of cues. This indicates that the severer the consequences under the contingency, the weaker the first-cause effect generated by the decision maker.

2.3 Repeat Effect

In 2005, Ge Jun, a domestic scholar, A study was conducted on the psychology of the audience from the perspective of repetitive effects in advertising communication.The survey showed that advertising requires repetition. In addition to the use of repetitive stimuli to enhance audience memory and the use of repeated broadcast or publication to increase the probability of message delivery to the target audience, evidence shows that repetition can strengthen the credibility of messages through psychological mechanisms such as the truth effect, familiarity effect and source memory error effect. In 2013, domestic scholars Zhao Xue and Ji Li analyzed the characteristics of the "repetition" articulation of TV commercials and concluded that "TV commercials have the characteristics of both audio and visual because of the TV medium", and therefore, TV commercials can use both Therefore, TV commercials can use both "repetition of words" and "repetition of words and on-screen text" to highlight the key messages in TV commercials. We regard this feature as the distinguishing feature of the "repetition" articulation of TV commercials.

However, these studies have not studied the rumor propagation phenomenon from other perspectives, and therefore have not answered questions about the relationship between precision pushing mechanisms and audience acceptance of rumors. This paper tries to answer the following questions from the theory of repetition effect and first cause effect: What casues the phenomenon that audience deeply believe in rumors? What are the motives that influence the audience's attitude toward rumors? What are the implications and lessons of this mechanism for society and media? This paper uses the research methods of questionnaire and interview to answer the above questions.

3 Method

Taking the media coverage and rumor spreading in the case of Hu Xinyu as an example, this paper attempts to answer the above questions by using the research methods of questionnaire and interview method.

3.1 Method one

The questionnaire explores the role of studying the first-cause effect and the repetition effect in the path of spreading online rumors by setting up the channels through which audiences of different age groups and education levels obtain information about the case of Hu Xinyu and their trust in the outcome of the incident and official notification, and proposes the following

hypotheses.

H1:The more attention audiences pay to rumors related to an event, the higher the reach of related rumors;

H2:The more attention audiences pay to rumors related to an event, the more profound their perception of related rumors;

H3:The more audiences pay attention to rumors related to an event, the more inclined they are to believe the related rumors.

To prove the hypothesis, this study uses questionnaire method, sampling the overall population and creating a questionnaire.

3.2 Method two

Through in-depth interviews with 20 volunteers, their conversations will be cited in the following text

4 Results

A total of 112 questionnaires are collected in this survey, with equal percentages of men and women, and the highest percentage of middle-aged people aged 31-65 was 64.3%. From the descriptive analysis, in the survey of Hu Xinyu case rumors, most people know about the case to the extent of "probably know (know the general situation)", accounting for 54.5%; while 21.4% of the people "get a steady on what is going on". Only 2.7% of people have never heard of the incident, indicating that the incident has a wide range of influence and the public has a good awareness of it. AAmong those who are already aware of this incident, they are very concerned about this case: 71.4% of the audience get the information from the mainstream media reports. The audience who spend 1-10 minutes on this case per day and occasionally pay attention to this case account for the most, and 60.7% of the people get it from short video platforms such as Douyin and Kuaishou, indicating that the majority of people get fragmented information.

In terms of the veracity of the news related to the event, 45.5% believe that most of the analyzed reports are true and a small portion is fabricated, while 38.4% believe that most is fabricated and a portion of it is true. It indicates that although audiences are clearly aware of rumors, the number and degree of people's acceptance of rumors are both vague and vary greatly. In the access to trsuted channel, more than 20% start to prefer the non-mainstream media.

Pearson correlation analysis reveals that correlation analysis of audience's degree of concern with rumor reach results in a correlation coefficient of 0.748**, with p showing a significant correlation at the 0.01 level, and H1 is suupported. The correlation analysis of the audience's degree of concern with the degree of rumor awareness results in a correlation coefficient of -0.663**, with p showing a significant correlation at the 0.01 level because the options of the

original questionnaire are opposite degrees, and H2 is supported: the more the audience pays attention to rumors related to an event, the more profound the awareness of related rumors. Correlation analysis of the audience's degree of concern for the degree of belief in the rumor results in a correlation coefficient of 0.815**, with p showing a significant correlation at the 0.01 level, and H3 is supported.

The findings suggest that algorithm-based recommendation systems can indeed amplify the spread of disinformation in risky social environments. Regression analysis shows that the design of the algorithm, the characteristics of the audience and their media literacy levels are significant predictors of the spread of disinformation through algorithm-based recommendation systems. In-depth interviews reveals different perceptions and experiences regarding algorithm-based recommendations and the spread of disinformation. Some people trust the recommendations provided by algorithms and rely on them to obtain information, while others are skeptical and critically evaluate the information they get. The results also suggest that media literacy plays a critical role in determining the extent to which disinformation is spread through algorithm-based recommendation systems.

This study provides insights into the relationship between algorithmic recommendations and the dissemination of false information in the context of a risk society. The results show that algorithm-based recommender systems can indeed amplify the spread of disinformation, and the extent of this amplification is influenced by a variety of factors, including algorithm design and audience characteristics. These findings have important implications for the design and use of algorithm-based recommender systems and highlight the need for further research to better understand the complex and evolving relationship between algorithm-based recommendations and disinformation propagation.

5 Discussion

5.1 The Phenomenon of Precision Push Messaging in the Risk Society

The so-called precisive recommendation is the use of various technological means to quickly and accurately deliver the user's preferences, life level, social status and content of concern to the user's mind. The most important feature of personalized information push is that it abandons the traditional way of manually selecting and pushing news content, and instead uses content algorithms and collaborative filtering algorithms to retrieve, filter, aggregate and distribute information. However, it is precisely because of this kind of push content, which relies entirely on mechanical data and machine calculations, that it leads people to many distorted and alienated situations step by step. Users inadvertently fall into the trap of algorithmic pushing.[5]

In this fast-changing Internet era, precise recommendation is a very important way to deliver information. At the same time, the rapid development of social media, Internet technology, and

the interaction between new and traditional media has led to a series of information explosions on the Internet, such as false news and rumors. At the same time, the explosion of information has also produced many adverse factors. On social media, the most common rumors and false information include medical news, political news, natural disasters news, breaking news, etc. The false messages that already exist in Douyin, Kuaishou and Toutiao includes:

(1) Medical and health misinformation: On the one hand, some media gain audience attention and click rates by reporting false information about the treatment or special efficacy of certain drugs. On the other hand, some businesses make untrue and exaggerated advertisements for the products they launch through one-sided interpretation and false marketing, taking advantage of consumers' desperate treatment psychology for promotion.

(2) Political misrepresentation: False news related to political events and policy documents spread through social networks, thus affecting public confidence in government agencies and the normalization of political life.

(3) Conspiracy theories: Some accounts exploit viewers' curiosity to over-interpret and promote large-scale public crises or diplomatic activities under the guise of revealing the truth, thus misleading the public's judgment and understanding of international relations.

(4) Financial scams: Some organizations use information such as "winning prizes" and "subsidies" to commit financial scams such as online loan scams, leading some people to believe the rumors and become victims of financial losses.

(5) Misinformation about public figures: Some organizations spread false information about public figures such as celebrities and politicians on the Internet, influencing people's perceptions of these people and damaging the image and reputation of public figures.

(6) Reports distorting facts: Many commercial social media account distort facts by piecing together edited videos, text and images to attract readers to view them.

These potential rumor crises may trigger a crisis of trust of the masses in the official media and mainstream media, reduce the credibility of the media, and then gradually lead to the intensification of negative feelings of the masses toward the government and the state, and further increase the degree of risk society.

5.2 The effects of primacy and repetition on the spread of online rumors

In this part, the study examines the first-cause effect and the repetition effect, two key factors contributing to the spread of online rumors. The first-cause effect refers to the tendency of people to give more weight to the information they encounter first, regardless of whether it is accurate or not. This can make the spread of misinformation difficult to contain. The repetition effect refers to

the fact that information is more likely to be remembered and believed if it is repeated often. This contributes to the spread of rumors online because repeated exposure to misinformation can lead people to believe it is true, even when there is no reliable evidence to support it.

In the study, several interviewees point out, "I didn't care about it at first, but I was curious to pay attention to it because it was often pushed by various apps and there were more news". Many Internet users passively followed Hu Xinyu's case amidst the overwhelming reports. In addition to using repetitive stimuli to strengthen audience memory and increase the probability of message delivery to the target audience, evidence suggests that repetition can strengthen the credibility of messages through psychological mechanisms such as the truth effect, familiarity effect, and source memory error effect. [8] Precisive recommendation uses repetition to "brainwash" users and force them to believe false information. Some interviewees say, "I didn't believe some of the information on the Internet, but some of it was justified, so I don't completely agree with those official statements. " This is the use of repetitive methods to plant a particular concept in people's minds. And because this concept has a strong support, the user preconceive that they are often exposed to the event reports are the original truth.

The combination of primacy and repetition effects can create a self-reinforcing cycle in which early adopters of misinformation spread it to others who, in turn, repeat it, leading to broader beliefs and further dissemination. This makes it particularly important for individuals to remain vigilant in verifying information before sharing it and for organizations to take steps to counteract the spread of misinformation.

5.3 The relationship between precisive recommendation and online rumors

In this part, the study discusses the relationship between precise recommendation and online rumor propagation, exploring how targeted notifications can help counteract the spread of misinformation and mitigate the effects of primacy and repetition effects.

From the current findings, it is clear that precise recommendation of big data is closely related to online rumor propagation. On the one hand, accurate data pushing can provide users with credible and trustworthy information and reduce the spread of errors or misinformation. On the other hand, but on the other hand, improper auditing and lack of gatekeeping in filtering information to deliver emotions can lead to accurate pushing that can amplify false or misleading information or expose people to biased or untrustworthy messages, thus contributing to the spread of online rumors.

In the survey on Hu Xinyu case, some interviewees say they originally learned about this matter through friends around. They went to search for the official report, and found a lot of questionable voices in the comments section. After that, when brushing the video, they often brush the so-called truth about the event to reveal the video. From this viewpoint, after the big data algorithm has deduced that the user has doubts and curiosity about Hu Xinyu's case, the

content of the push is changed, and videos or articles containing keywords related to "Hu Xinyu" are targeted, exposing the user to one-sided and unverified information and amplifying the spread of rumors on the Internet.

Ultimately, the relationship between precisive recommendation and online rumors depends on a variety of factors, including the technologies and algorithms used for data analysis and precisive recommendation, the unnatural and social factors that influence the spread of online rumors, and the social and cultural contexts in which information is shared and consumed.

6 Conclusion

6.1 Algorithms implant rumor opinions by means of repetition and the first cause effect

This paper illustrates the complex relationship between accurate and targeted precision tweets and the spread of online rumors, and highlights the importance of considering primacy and repetition effects in this context. By understanding the impact of these factors, organizations and individuals can take steps to reduce the spread of misinformation and promote a more sensible and trustworthy digital environment.

This study theorizes the phenomenon of repetitive effect and first cause effect of algorithmic push on rumor propagation by means of audience surveys and interviews, trying to answer the question of the relationship between algorithmic push in the path and effect of rumor propagation. The hypotheses are found to be valid through the study, mainly because the precisive recommendation mechanism brings about the repetition effect of rumors, which makes the audience's attitude toward rumors increasingly inclined to believe them. However, when the rumor debunking information reachese, users, although they may believe it, may quickly forget the rumor debunking information due to the first cause effect.

6.2 Improve discernment to avoid falling into the trap of precisive recommendation

This study analyzes various factors of rumor spreading path and the psychological phenomenon of audience treating the acceptance of disinformation, and finds that people's trust in rumors is influenced by algorithmic pushing. Among them, the less educated groups who have poorer discernment ability are more easily driven by rumors. To a certain extent, the spread of rumors has forced people to improve the ability to discern information. On the one hand, the phenomenon of algorithmic recommendation of rumors reflects the new channels and diversification of public opinion dissemination in the risk society and the autonomy of audience's choice in receiving information. On the other hand, it also provides a reference for the government to guide public opinion in the new media era of modern China.

However, it is noteworthy that this study also finds that the phenomenon of algorithmic

recommendation of rumors has the negative impact on audience's distrust of media triggered by social depression, which is worthy of caution and reflection. These findings have important implications for the design and use of algorithm-based recommendation systems, and more work needs to be done to better understand the complex and evolving link between algorithm-based recommendations and the proliferation of misinformation.

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