

# The Polarization of Public Opinion on Weibo about Public Affairs of People's Livelihood in China

Ziran Chen<sup>1</sup>, Yaohua Liu<sup>2\*</sup>, Shuyan Ren<sup>3</sup> and Yutong Zeng<sup>4</sup>

<sup>1</sup>The School of Statistics and Mathematics, Zhongnan University of Economics and Law, Wuhan, Hubei, 430073, China

<sup>2</sup>School of Finance and Investment, Guangdong University of Finance, Guangzhou, Guangdong, 510600, China

<sup>3</sup>Surrey International Institute, Dongbei University of Finance and Economics, Dalian, Liaoning, 116025, China

<sup>4</sup>School of Business, Hubei University, Wuhan, Hubei, 430062, China

**Abstract.** Social media has become a key platform for public discussion and dissemination of social events but has also led to the Echo chamber effect and emotional polarization. This study uses the “Jiang Ping incident” as a case to explore emotional polarization in public opinion on Chinese social media platforms, specifically Weibo. The study first reviews relevant theories, including the Echo chamber effect, selective information preference, silence behavior, and opinion-emotional contagion. Then, using a questionnaire survey, empirical data were collected, and factor analysis was conducted to extract key common factors influencing emotional polarization. In the final regression analysis, the impact of these three common factors on the polarization of public opinion groups was further examined. The results show that selective information preference and opinion-emotional contagion have a significant negative impact on emotional polarization. Additionally, silence behavior was also found to have a negative impact on emotional polarization, suggesting that users’ silence behavior in the face of opposing opinions may exacerbate the degree of emotional polarization. Finally, the study provides recommendations for social media platform managers and policymakers to mitigate emotional confrontation on social media and promote more rational public discussion.

## 1 Introduction

### 1.1 Background

With the development of social media, Weibo and other platforms have become important places for the public to discuss and spread social events. Meanwhile, the China Internet Network Center reported that in June 2021, the number of Internet users in China had

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\* Corresponding author: [211511343@m.gdudf.edu.cn](mailto:211511343@m.gdudf.edu.cn)

approached 1.1 billion, and the Internet penetration rate had exceeded 70 percent, the Internet has become the most important communication platform. However, the Internet platform also provides an opportunity for users to vent their negative emotions. Li Yihan and Wei Chen mentioned in their research that due to the impact of COVID-19, negative emotions are always around the public, and this has indirectly led to public outcry on the internet platforms [1]. These platforms also contribute to the Echo chamber effect and emotional polarization. The echo chamber effect refers to the process of information transmission, similar or the same idea is repeated and reinforced, and the opposite idea is ignored or rejected. This is particularly evident on social media, where users tend to interact with like-minded people, unwittingly reinforcing their own views and polarizing their emotions and positions.

Jiang Ping's case is one of the most hotly discussed on social media in recent years, when a female student from a technical secondary school entered the Alibaba Math competition and won 12th place in the world, the news of the victory over the competitors of many of the world's top universities has been the subject of heated discussion on Weibo for days, with the news reaching a staggering 84.2 on the Impact Index, 98% more than in the period. Some of the stories about Jiang Ping have been read more than 50 million times on Weibo and have been reprinted and reported by several authoritative Chinese media outlets. The development of the case shows a typical case of emotional polarization. From the beginning when Jiang Ping got an excellent result in the mathematics competition, the public's emotions experienced a complex process from the initial praise to the mid-term doubt, and then to the later emotional opposition and differentiation. This event has not only triggered widespread concern about educational equity and talent development but also revealed the complexity of information dissemination and the evolution of public sentiment in the context of social media.

## 1.2 Research implications

This study takes Jiang Ping incident as an example to explore the emotional polarization of public events related to people's livelihood on social media platforms such as Weibo. By analyzing the change of public opinion in different stages of the event, this paper aims to reveal the generating mechanism and influencing factors of emotional polarization. The significance of this study is mainly embodied in the following aspects:

First, a deep understanding of emotional polarization helps to reveal the role of social media in the field of contemporary public opinion and its potential social impact. Through the study of Jiang Ping's incident, how social media-driven emotional polarization intensifies social division and antagonistic emotions can be better understood.

Second, the findings of this study can inform managers and policymakers of social media platforms to help them strike a balance between upholding freedom of expression and promoting healthy public discourse. By identifying the key drivers of emotional polarization, valuable recommendations can be made to reduce social media antagonism and defuse social tensions.

Finally, this study will provide a reference for the public in the face of similar events, so that they can be more comprehensive and rational in the social media environment, to make more informed decisions in a democratic context. In conclusion, this study has not only theoretical significance but also practical value.

## 2 Literature review

### 2.1 Literature review

Echo chamber effect refers to the enhancement of information or ideas in a closed circle, resulting in a distorted perception of the consensus. When individuals hear only voices that match their own opinions in cyberspace, they mistakenly think their views represent the mainstream, Hu said [2]. The group polarization theory further states that the Echo chamber effect strengthens the existing viewpoints in the group and leads to polarization [3]. The echo chamber effect causes individuals to form close relations with people with the same opinions, and the opinions and information tend to be extreme, which gradually eliminates “Heretical thinking” [4]. In this process, the individual will produce exclusivity, refuse to accept the voice that does not accord with the group view, and reject the content that does not accord with his worldview [5]. In contemporary society, Echo Chambers have been proven to exist in various forms of online media, which are often seen as pluralistic and open but are influenced by the Internet and personalized recommendation algorithms, the Echo chamber effect has been further reinforced by the increasing simplification of the information that individuals are exposed to [6]. Echo chamber effect not only has a profound impact on individual cognition but also causes social conflict, hinders social unity and the spread of truth [7].

Through constructing the interaction model of the social network, selective contact and the formation of homogeneous social circles are the key factors of group polarization that can be analyzed [8]. By analyzing the phenomenon of group political polarization in online social networks with the micro-behavioral model, the avoidance behavior of individuals when they interact with dissidents and the reinforcement mechanism when they interact with people with similar views, as a result, groups gradually form more extreme and homogeneous views in the network structure [9]. In the research of the polarization of opinion field, some scholars think that polarization is the result of the combination of individual prejudice, group prejudice, and systematic prejudice [10]. The personal information dilemma-group opinion gathering interaction-public opinion group polarization model concretely expounds the traveling mechanism of emotional polarization under the Echo chamber effect. Especially for the Jiang Ping incident, it can well explain the development of each period of emotional polarization [5].

In the present research, there are extensive discussions on the application of questionnaire design in the polarization of public opinion group and Echo chamber effect. By designing a questionnaire, CAO focused on the aggression and rationality dimensions in the comments to investigate the phenomenon of group polarization in events involving vital interests [11]. Li Jinze synthetically considered many variables, such as group identity and emotion, built a model, and designed a questionnaire to quantify the degree of group polarization. These studies show that the questionnaire design needs to pay special attention to the accurate measurement of multi-dimensional factors such as emotion and cognition when discussing the polarization of online public opinion [12].

In the aspect of the Echo chamber effect, Li investigated the influence of social network structure on the Echo chamber effect and revealed the law of its occurrence and development [13]. Jasny et al measured the consistency and multi-channel characteristics of information transmission by using the questionnaire and the method of exponential random graph and verified the effect of the Echo chamber effect. In addition, Geschke analyzed the effects of individual cognitive and social preferences on the generation of Echo chamber effect by questionnaire and ABM model and predicted the future development trend of individual behavior [14]. Through the questionnaire design, Xu carried on the simulation analysis from two aspects of the consensus and the public opinion evolution time and further revealed the

specific mechanism of the Echo chamber effect. These research results provide useful references for the questionnaire design and are helpful for better understanding and dealing with the polarization and Echo chamber effect in Internet public opinion [7].

## **2.2 Concept definition**

The echo effect refers to the phenomenon of self-reinforcement and filtering of information in the process of information transmission and social networks [4]. This kind of effect causes the individual to a different viewpoint contact to reduce, further strengthening the original position, forming the homogeneity opinion environment.

### *2.2.1 Preference for congruent information*

Coordinated information preference refers to an individual's tendency to choose, access, and believe information that is consistent with his or her existing beliefs, attitudes, or opinions. This preference can be viewed as a cognitive bias that makes individuals, faced with a large amount of information, more inclined to ignore or avoid information that contradicts their current beliefs, and more likely to accept and share information that is consistent with their views. This phenomenon is widespread in social media and online environments, as these platforms often recommend content that is consistent with users' existing opinions based on their behaviors and preferences, thus further reinforcing individuals' existing beliefs and promoting the Echo chamber effect of information. Research shows that coordinated information preferences may lead to information filtering and information polarization, making individuals' views more extreme and rigid.

### *2.2.2 Silencing behavior*

Silent behavior refers to the tendency of individuals to choose not to publicly express or refute opinions or information that are inconsistent with their existing opinions. The concept is derived from the "Spiral of Silence Theory," which suggests that individuals may choose to remain silent during social interactions out of fear of isolation or fear of negative judgment, especially if they believe their views are in the minority. This behavior is particularly pronounced in online Settings, where the anonymity and publicity of online social platforms can exacerbate an individual's concerns about potential negative reactions. The consequence of the act of silence is that it may inhibit the expression of diverse views, lead to the uniformity and polarization of public opinion, and weaken the space for rational public discussion and debate.

### *2.2.3 Opinion emotional contagion*

Opinion emotional contagion refers to the phenomenon that individuals change their emotional states and attitudes in the process of social interaction under the influence of others' emotions. In the online social environment, emotional contagion is particularly significant because people are more likely to express and disseminate emotional content through multimedia forms such as text, pictures, and videos. Research shows that emotional information is more likely to be widely shared and disseminated online, which in turn affects the emotions and attitudes of others. Opinion emotional contagion can lead to the rapid spread of certain emotions, making the public opinion environment more emotional and polarized. Due to the emotional contagion effect, individuals may be unconsciously affected when they

are exposed to opinions or information with strong emotional colors, thus strengthening their existing emotional states and attitude tendencies.

## **2.3 Research content**

### *2.3.1 Questionnaire design*

In this study, to analyze the intension of the polarization of public opinion sentiment deeply and determine its key dimensions, the targeted questionnaire questions can be designed. As for the polarization of public opinion, the variable dimension is determined from the intensity and tendency of the emotion, so that the questionnaire can comprehensively cover the different manifestations of the polarization of public opinion.

The existing emotional analysis framework can be used for reference to determine the classification and judgment criteria of the questions in the questionnaire.

In this paper, similar questions can be set to understand the attitude of respondents to the emotional polarization of public opinion reasons, as well as their concerns about the object of discussion and related emotional reactions. For example, ask respondents what specific reasons they support or oppose an event that causes emotional polarization

In this study, according to public opinion emotional polarization phenomenon of the characteristics of the community to studied.

In this study, this method can be used for reference, and choose a suitable sampling method according to the research objectives and the characteristics of the subjects.

To determine the overall scope of the study and then conduct a sampling, such as selecting specific regions, platforms, or groups, and then randomly selecting specific survey subjects from them, to ensure that the sample can cover different characteristics of the population, improve the generalizability and reliability of research results.

### *2.3.2 Model setting*

In this study, the occurrence and effect of the Echo chamber effect are taken as independent variables, the degree and performance of emotional polarization as the dependent variable, and the basic regression equation, focuses on the process of emotional polarization, the effect of Echo chamber effect on polarization and the extent to which it is explained, when the independent variable has a significant effect on the dependent variable, the frequency of social media use, education level and political orientation were used as control variables to ensure that the results mainly reflected the relationship between independent and dependent variables, rather than being influenced by other unrelated factors.

## **2.4 Assumptions**

In this study, we analyze the Jiang Ping incident and integrate existing theoretical frameworks to explore the mechanisms behind the formation of emotional polarization phenomena on social media platforms such as Weibo. According to the Echo chamber effect and group polarization theory in the literature review, individuals tend to contact information that aligns with their pre-existing views, and social media algorithms further amplify this trend. This leads to the contagion and amplification of emotions within social networks, thereby intensifying group polarization in public opinion.

Additionally, silence behavior and opinion emotional contagion play crucial roles in such events. When people feel group pressure in an online environment, they are more likely to

remain silent and avoid expressing opinions that contradict mainstream views. This behavior inhibits the expression of diverse viewpoints, causing the public opinion environment to become homogeneous and extreme. The contagious nature of emotions also causes negative emotions to spread rapidly online, further exacerbating emotional polarization. Based on these theories and empirical analyses, we have constructed four hypotheses for this study

H1: Echo chamber effect has a directional effect on the polarization of opinion groups.

H1A: concordant information preference has a positive effect on opinion group polarization.

H1B: Silence has a positive effect on the polarization of opinion groups.

H1C: opinion contagion has a positive effect on the polarization of opinion groups.

The independent variable was the Echo chamber effect, the dependent variable was polarization of public opinion, and the mediating variable was tested. This model can help to verify how the Echo chamber effect affects the emotional polarization of public opinion through some psychological or behavioral mechanisms, such as opinion reinforcement or emotional contagion.

### **3 Methodology**

The purpose of this study is to explore the polarization of public opinion on microblog about public affairs of People's livelihood in China, and to obtain comprehensive and accurate data to support the research conclusion.

To ensure the objectivity and comprehensiveness of the research, the group is precisely selected as the core research object. In the process of sample collection, diversified strategies are adopted, including the use of micro-blogs and other social networking platforms, and mobilizing teachers and students to help spread the questionnaire. Samples were selected strictly following established criteria and focused on target groups within a specific age range to ensure representative and diverse sample selection.

To improve the efficiency and standardization of data collection, the implementation of the questionnaire with the help of the questionnaire star professional platform, using its data management and analysis functions to provide technical support for the implementation of the questionnaire. The questionnaire was distributed through a variety of channels, including online social media, e-mail, and specific campus locations, ensuring a broad and targeted survey coverage. The whole distribution cycle is carefully planned, after 3 weeks, from July 29 to August 19, to ensure the timeliness and continuity of data collection.

A total of 105 responses were received during the questionnaire recall phase. Then, through the strict screening and auditing mechanism, the invalid questionnaire, including the all-choice-one-option and the obvious regularity of the answers, was eliminated, and a high-quality and effective questionnaire was finally determined. The validity of the questionnaire is strictly controlled in both the pre-survey and the formal survey stage. Although there were some invalid questionnaires in the pre-investigation stage due to specific reasons, the overall effective recovery rate remained at a high level, and both the number of effective questionnaires and the effective rate achieved the expected target. The data processing link is also rigorous and meticulous, collecting the respondents' opinions, and using the SPSS Statistical Software for scientific input, processing, and analysis of the data, and at the same time strictly testing the reliability and validity of the questionnaire, the reliability and accuracy of the results were ensured. This series of processes for the study laid a solid database for the follow-up analysis and conclusions provide strong support.

## 4 Results

### 4.1 Questionnaire validity analysis

This study used SPSS 20.0 to test the validity of the selected scale to test the reliability and accuracy of the scale, the common factor and several common factors can be extracted from the measurement items which belong to a concept by mathematical analysis. KMO and Bartley's spherical test are used in this study. When  $KMO > 0.9$ , the construct validity is very good,  $0.9 > KMO > 0.8$ ,  $0.8 > KMO > 0.7$ , the construct validity belongs to the general category,  $KMO < 0.5$  means that the poor structural validity cannot be analyzed by factor analysis. In the above cases, the factor analysis can only be done if the condition of the Bartlett test is significant.

Table 1 KMO and Bartlett spherical test for echo chamber variables showed that the core variable KMO value was greater than 0.8 and the significance of Bartlett spherical test was lower than 0.01, the scale used in this paper can be used for factor analysis.

**Table 1.** KMO and Bartlett's test-opinion group polarization

Kaiser-meyer-olkin measure of sampling adequacy.		.929
Bartlett's sphere test	Approximately chi-squared	869.639
	Df	105
	Sig.	.000

### 4.2 Common factor extraction

In this part, the number of common factors is determined by the gravel chart and the explanation of total variance. When the eigenvalues of the graphs were greater than 1, the common factors were 3. There are three main factors selected from Table 2. The characteristic roots of the first, second and third main factors are 2.839,1.896 and 1.744, respectively, the contribution rates of variance of the three main factors are 28.393%, 18.956%, and 17.440% respectively, and the cumulative contribution rates of variance of the three main factors are 64.789%. Therefore, the three common factors can well explain the information of the original variables, the three common factors can be used for factor analysis.

**Table 2.** The total variance of the explanation

Ingredients	Initial eigenvalue			Extract the squares and loads			Rotate the squares and load		
	Total	% of variance	Cumulative%	Total	% of variance	Cumulative%	Total	% of variance	Cumulative%
1	4.570	45.703	45.703	4.570	45.703	45.703	2.839	28.393	28.393
2	1.010	10.095	55.798	1.010	10.095	55.798	1.896	18.956	47.349
3	.899	8.991	64.789	.899	8.991	64.789	1.744	17.440	64.789
4	.712	7.119	71.908						
5	.676	6.759	78.667						
6	.565	5.646	84.313						
7	.461	4.617	88.930						

	2								
8	.428	4.282	93.212						
9	.371	3.706	96.917						
10	.308	3.083	100.000						
Extraction method: principal component analysis.									

### 4.3 The composition matrix table

Since the 9th -23 items in the questionnaire indicate the polarization of the public opinion group and the 24th -33 items indicate the Echo chamber effect, this study carried out the principal component analysis. The results of the factor analysis of the Echo chamber effect are shown in Table 3. Three common factors with characteristic values greater than 1 were extracted from the scale, and their cumulative explained variance ratio to echo chamber was 64.789%, which indicated that the structure of the Echo chamber effect scale was feasible, the interpretation ability of the three common factors to the echo chamber is feasible, and the factor loads of all items are higher than 0.5. According to the results of factor analysis, the Echo chamber effect was defined as coordinated information preference, silence behavior, and opinion-emotion transmission according to three component factors.

**Table 3.** Rotation component matrix A

	Ingredients		
	1	2	3
Do you prefer to view and forward messages or comments that are in line with your own views when you are following the Jiang Ping incident?	.656		
25. Do you feel that the content recommended by social media algorithms often reinforces what you already know about Jiang Ping?	.632		
26. When participating in the discussion of Jiang Ping's incident on social media, do you actively seek out groups or communities that are in line with your own views?	.741		
When you see comments on social media that differ from your own views on the Jiang Ping incident, do you prefer to remain silent rather than express a different opinion?		.549	
28. Are you afraid of being verbally abused or socially ostracized for posting comments on social media that don't fit with mainstream opinion, and so choose to remain silent?	.801		
During the discussion of Jiang Ping's case, have you ever chosen not to express your views for fear of being isolated or misunderstood?		.860	
30. Do you feel that strong emotions (e.g. anger, support) on social media about Jiang Ping's incident will affect your emotional state?			.544
31. When browsing social media, do you feel frustrated or angry because you see most people's negative comments about Jiang Ping's incident?		.589	
32. Do you feel that the opinions of opinion leaders or high-impact users on social media have had a significant impact on your perception of the Jiang Ping incident, or even changed your original views?			.703
33. During the discussion about Jiang Ping, did you ever express your views more strongly, for or against, because of the emotions of the people around you (both online and offline) ?			.781
Extraction Method: principal component.			
Rotation: orthogonal rotation with Kaiser standardization.			
A. rotation converges after 8 iterations.			



### 4.4 Establishment of regression model

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \Delta_i \tag{1}$$

The intercept term ( $\beta_0$ ) in the model represents the baseline level of public opinion emotional polarization when all independent variables ( $X_1, X_2, X_3$ ) are zero. Although it may not have a direct physical interpretation, it serves as a reference point. The regression coefficients ( $\beta_1, \beta_2, \beta_3$ ) indicate the marginal contribution of each independent variable to the emotional polarization of public opinion. For instance, a positive  $\beta_1$  suggests that “coordinated information preference” is positively correlated with emotional polarization, while a negative value would indicate a negative correlation. The same interpretation applies to  $\beta_2$  and  $\beta_3$ . Additionally, the error term ( $\Delta_i$ ) highlights that the model does not perfectly predict emotional polarization. This term accounts for the various complex factors that influence polarization but are not captured by the model, reflecting the unpredictable or unmeasured effects.

### 4.5 Regression analysis

This study verified the influence of three factors of Echo chamber effect, namely coordinated information preference, silent behavior and opinion emotional contagion, on public opinion group polarization through regression analysis. Factor analysis has shown that correlation between variables, to understand the directivity between variables, you need to do regression analysis.

**Table 4.** Model Evaluation

Model	R	R <sup>2</sup>			
1	.788 <sup>a</sup>	.620			
Model	Quadratic sum		DOF	F	Significance
1	Regression	65.933	31	3.687	.000 <sup>b</sup>
	Residual	40.381	70		

Based on the evaluation of the model (table 4), the R-squared value of 0.620 indicates that the model has a good explanatory power for the dependent variable, emotional polarization. The F-value (3.687) and the significance level also suggest that the overall fit of the regression model is strong, with the independent variables having a significant impact on the dependent variable. Overall, the model we established can provide a relatively accurate prediction of the variation in the dependent variable.

**Table 5.** Regression Results

Model	Regression results
(Constant)	1.839*** (1.004)
REGR factor score 1 for analysis 1	-.620*** (-1.432)
REGR factor score 2 for analysis 1	-.365*** (-1.326)
REGR factor score 3 for analysis 1	-.662*** (-2.421)

Figure 5 presents the regression results of the Echo chamber effect on public opinion polarization (\*\*\* indicates  $p < 0.01$ , \*\* indicates  $p < 0.05$ , \* indicates  $p < 0.1$ , and the values in parentheses represent T-value.).

The results show that the regression coefficient of the Echo chamber effect is significantly positive at the 5% significance level, indicating that the Echo chamber effect has a significant negative impact on public opinion polarization. The variation in public opinion polarization can thus be explained by the Echo chamber effect, supporting Hypothesis H1. It can also be seen that the effects of preference for consistent information, silence behavior, and opinion emotional contagion on group polarization are all significant at the 5% significance level, indicating negative impacts.

Specifically, Figure 7 demonstrates that when controlling for other variables, an increase of one unit in each of these three variables results in a decrease in public opinion polarization by 0.620, 0.365, and 0.662 units, respectively. Thus, Hypotheses H1a, H1b, and H1c are not supported. Among these variables, opinion emotional contagion has the most significant impact on public opinion polarization.

The constant's regression coefficient is 1.839 and is significant at the 1% level ( $p < 0.01$ ), indicating that even without the influence of other variables, there is still a significant baseline level of public opinion polarization. This suggests that public opinion polarization would naturally occur to some extent, even without considering the effects of the echo chamber, preference for consistent information, silence behavior, and opinion emotional contagion.

The regression coefficient for the Echo chamber effect is -0.620 and is significant at the 1% level ( $p < 0.01$ ), indicating that the Echo chamber effect has a significant negative impact on public opinion polarization. This means that for each unit increase in the Echo chamber effect, the level of public opinion polarization decreases by 0.620 units. Although the Echo chamber effect is typically thought to exacerbate group polarization, this study suggests that the Echo chamber effect may instead reduce group polarization, possibly due to users' rational decision-making in choosing information, which reduces the risk of polarization.

The regression coefficient for preference for consistent information (REGR factor score 2 for analysis 1) is -0.365 and is significant at the 1% level ( $p < 0.01$ ). This means that when users tend to choose information consistent with their existing views, public opinion polarization decreases by 0.365 units. This result implies that, while selective exposure to information is generally thought to exacerbate polarization, in some contexts, users' deliberate choice of consistent information might lead them to be more cautious in public discussions, thereby reducing polarization.

The regression coefficient for opinion emotional contagion (REGR factor score 3 for analysis 1) is -0.662 and is significant at the 1% level ( $p < 0.01$ ), indicating that opinion emotional contagion has the strongest negative impact on public opinion polarization. For each unit increase in the effect of opinion emotional contagion, group polarization decreases by 0.662 units. This suggests that while emotional contagion within opinions might lead to greater internal group coherence, it could also encourage users to express their opinions more cautiously, thus reducing the polarization phenomenon

## 5 Discussion

### 5.1 Polarization and the causes of the echo chamber

#### 5.1.1 Emotional drive and herd mentality

Emotions play a key role in the formation and development of public opinion. When an individual is dominated by strong emotions, his ability to think rationally is often inhibited and he is more likely to make extreme judgments and actions. At the same time, the herd mentality also has an important impact on the formation of an individual's point of view. In

a group environment, individuals tend to follow the opinions of the majority to gain a sense of identity and belonging, which leads to the convergence and polarization of views. Once an emotion starts to spread, many people get infected and join in, even if their original views are not strong. This interaction of emotion-driven and herd mentality further promotes the development of polarization and Echo chamber effect.

### *5.1.2 Social contradiction and realistic pressure*

Various contradictions and pressures in the real society are inevitably reflected in the cyberspace. When people are dissatisfied or anxious about social problems, they tend to look for outlets on the internet and are more likely to express extreme views. For example, the gap between rich and poor, social inequality and other issues will lead to opposition between different groups, in the network of public opinion as a polarized conflict of views. Real-world conflicts can exacerbate people's emotional reactions, making online opinion more extreme. In addition, the uncertainty and rapid changes in the social transition period will also bring people psychological pressure, prompting people to seek recognition and support on the internet, further reinforcing the polarization phenomenon.

### *5.1.3 Media Environment and information dissemination*

The media's way of reporting and the mechanism of information transmission have an important influence on polarization and Echo chamber effect. In the highly competitive media environment, some media may adopt exaggerated and one-sided reporting methods to pursue click-through rate and attention, and deliberately highlight the controversial and conflicting nature of the event, thereby exacerbating the opposition of views. At the same time, the algorithmic recommendation system of social media provides users with personalized information services, but it is also easy for people to fall into the information cocoon, only access to information from their own point of view. In addition, the agenda-setting function of the media may also, to a certain extent, lead the public to pay attention to certain specific issues and views, thus aggravating the polarization of public opinion.

## **5.2 Effects of polarization and the echo chamber**

### *5.2.1 Aggravate social divisions*

Polarization and the Echo chamber effect will lead to antagonism and conflict between groups with different views, and seriously destroy social harmony and stability. In the field of network public opinion, it is difficult for people to carry out rational dialogue and communication, often falling into a vicious circle of mutual attacks and accusations. There are some things that continue to grow for you: on some major social issues, conflicts between groups of different positions may further intensify, making it difficult to form a social consensus, and making it harder to govern. The antagonism and conflict between different groups may also spread to real life, causing social instability and causing serious impact on social order.

### *5.2.2 Hinders problem-solving*

Extreme views and opposing attitudes are not conducive to solving the problem. It was difficult to find an effective solution when all parties stood firm and were unwilling to compromise and cooperate. In the process of public policymaking, if the polarization between

different interest groups is serious, it may lead to difficulty in promoting policies and affecting the development and progress of society. For example, on major issues such as the environment and economic development, polarized views may hinder joint efforts to find sustainable solutions. In addition, polarization can lead to an unreasonable allocation of resources, making the problem more complex and difficult to solve.

### *5.2.3 To limit the development of the mind*

Being in the Echo chamber effect for a long time, the individual's thinking will be greatly restricted, and it will be difficult to access different views and ideas, which will affect the individual's cognitive development and innovation ability. People may become more opinionated and unwilling to accept new ideas and challenges, which impedes personal growth and progress. For example, in a particular circle of interest or social group, individuals are often only exposed to information that is consistent with their own views, and lack of reflection and reflection on different points of view, which leads to rigid thinking. In addition, being in the echo chamber for a long time may lead to the narrow field of vision of individuals, unable to understand the world and solve problems comprehensively.

### *5.2.4 Increase psychological stress*

Taking part in a polarized public opinion environment can cause tremendous psychological stress to individuals. When people are faced with intense conflicts of views and attacks, it is easy to produce anxiety, anger, and other negative emotions, affecting mental health. For example, being attacked and verbally abused by others on the internet may cause psychological trauma to individuals and even affect real-life interpersonal relationships. At the same time, long-term in such a tense public opinion environment, individuals may feel tired and helpless, and doubt their own views, further aggravating the psychological burden.

## **5.3 Measures to deal with polarization and echo chamber**

### *5.3.1 Improve media literacy*

Individuals should strive to improve their media literacy and learn to view media information critically and not blindly believe and disseminate unverified information. In the era of information explosion, individuals should have the ability to distinguish the authenticity of information, and access information through multiple channels to avoid falling into the information cocoon. For example, learn to get information from different media platforms, analyze the arguments behind each side, and enhance the ability to identify information. At the same time, individuals should also enhance the vigilance of false and misleading information, and not to be misled by false information. Therefore, improving media literacy is an important means for individuals to cope with polarization and Echo chamber effect in the internet age.

### *5.3.2 Cultivate rational thinking*

When participating in public discussions, one should be rational and calm and avoid being influenced by emotions. Learn to use objective facts and logic to analyze problems, and respect different points of view, with an open mind for dialogue and exchange. In the face of controversial issues, individuals should not easily make extreme judgments, but by collecting more information and in-depth thinking to form their own views. For example, in the face of

a hot event, you can first understand the whole picture of the event and different aspects of the point of view, and then rational analysis and judgment. Cultivating rational thinking can help break down the limitations of thinking and reduce the impact of polarization. Therefore, rational thinking is the key for individuals to maintain independent thinking in online public opinion.

### *5.3.3 Optimize the media environment*

The media should shoulder their social responsibility, adhere to the principle of objective and fair reporting, and avoid one-sided and exaggerated reports. The media should provide an accurate cognitive basis for the public with true and comprehensive information and reduce the dissemination of misleading information. At the same time, actively promote the exchange of different views and dialogue, to provide the public with diversified information. For example, the media can promote rational public thinking on complex issues by holding thematic discussions and inviting guests with different perspectives. In addition, the media is to continue to generate content for you: in addition, the media should also strengthen the dissemination of information on the supervision, and improve the quality of information and credibility. Through the establishment of a sound information audit mechanism to filter false information and bad information for the public to create a healthy and orderly information environment.

### *5.3.4 Strengthen Education and guidance*

Schools and society should strengthen education and guidance to the public, and improve people's rational thinking ability and communication ability. Through media literacy education, civic education, and other activities to cultivate people's sense of social responsibility and public awareness. In school education, relevant courses can be set up to cultivate students' critical thinking and multiple perspectives and improve their ability to survive in the information age. For example, the introduction of media literacy courses, so that students understand the operation of the media and the characteristics of information dissemination and learn to distinguish the authenticity and value of information. At the same time, the community can also organize a variety of lectures, training, and other activities to improve the public's media literacy and rational thinking.

### *5.3.5 Improve Institutional Development*

The government should strengthen the management of cyberspace, improve relevant laws and regulations, and crack down on the spread of rumors and harmful information on the internet. It should establish and improve a mechanism to guide public opinion online, respond to public concerns in a timely manner, and defuse conflicts and conflicts. For example, increased regulation of social media platforms requires them to strengthen content censorship and management and to impose severe penalties for the dissemination of false and undesirable information. At the same time, the government can also establish the network public opinion monitoring system, timely grasp the network public opinion dynamics, and take effective measures to guide public opinion in a positive and healthy direction.

## **6 Conclusion**

Polarization and the Echo chamber effect are important problems in the information age. The causes of polarization are complex, and the consequences cannot be ignored. Through

empirical analysis, this paper can conclude that the Echo chamber effect has a positive impact on the polarization of public opinion groups. Through factor analysis, three common factors were extracted from the Echo chamber effect of the questionnaire information: the information preference of coordination, the silence behavior, and the opinion emotion infection. Through regression analysis, the original hypothesis is refuted, and the research data shows that the polarization of the public opinion group has a negative effect, the silence behavior has a positive effect on the polarization of the public opinion group, and the opinion sentiment infection has a positive effect on the polarization of public opinion group. So much so that joint efforts should be made at the individual and social levels to improve media literacy, foster rational thinking, optimize the media environment, strengthen educational guidance, and improve institutional construction, it can effectively deal with polarization and the Echo chamber effect, and promote the harmonious development of society and individual cognitive progress. In the future, further exploration for the mechanism of polarization and Echo chamber effect is needed, as well as more effective coping strategies, to provide theoretical support and practical guidance for constructing a healthy and rational network public opinion environment.

## Authors Contribution

All the authors contributed equally and their names were listed in alphabetical order.

## References

1. Y. Li, C. Wei. Reflections on the Management of Online Public Opinion Crisis Based on the Sudden Epidemic in Nanjing. *Modern Business Trade Industry*, (2022).
2. Y. Hu, New Words: Echo chamber effect. *Journalism and communication research*, (2015).
3. M. Cinelli, G. D. F. Morales, A. Galeazzi, The Echo chamber effect on Social Media. *Proceedings of the National Academy of Sciences*, (2021).
4. D. Wang, Research on the influence of Echo chamber effect on transmission. *Communication Theory and History*, (2018).
5. J. Chen. An empirical study on the influence of the information cocoon on the polarization of public opinion groups in the new media era. *Chongqing Technology and Business University*, (2023).
6. S. Ding. A study on the Echo chamber effect in the use of microblog by college students. *Chang 'an University*, (2018).
7. Y. Xu, Echo Chamber in the evolution of public opinion. *Huazhong University of Science and Technology*, (2020).
8. L. Wei, Returning to dialogue: a study on the path of network group polarization. *Journalism University*, (2021).
9. F. CHEN, Comments and Links: Group Political Polarization in Social Networking Sites: An Explanation Based on Micro Behaviors. *Chinese Journal of Sociology*, (2017).
10. Y. Bai, A Study on the Phenomenon of Opinion Polarization in the Public Opinion Field: Causes, Identification, and Countermeasures. *Library and Information Knowledge*, (2022).
11. J. Cao, Study on the Phenomenon of Group Polarization among Chinese Netizens. *Qufu Normal University*, (2012).

12. J. Li, Study on the Factors Influencing Group Polarization of Public Opinion in the Perspective of Social Media. Graduate School of the Chinese Academy of Social Sciences, (2020).
13. W. Li, Simulation Experiment Analysis of the Echo chamber effect in Information Dissemination on Social Networking Platforms. *Modern Communication: Journal of Communication University of China*, (2019).
14. L. Jasny, J. Waggle, D. Fisher, An Empirical Examination of Echo Chambers in US Climate Policy Networks. *Nature Climate Change*, (2015).