Research on the Connection Between Emotional Factors and the Dissemination Process of Hot Words

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Abstract. In the era of the popularization of network social media, hot words appear frequently. This study focused on exploring the dissemination process of common hot words, such as phrases or names of people, things, and events. The research assumed that emotional factors play a role in the dissemination process of hot words. A case study was conducted using Weibo. Our focus was the dissemination process of the word “Covid-19” from January 23 to March 31, 2020. This paper summarizes the connection during this period between the hot discussion amount of the word “Covid-19” and the emotions of netizens on Weibo. Combining specific data on hot discussion amount and the percentages of seven emotions (happiness, love, sadness, anger, fear, disgust, and surprise) shown in the comments of netizens, this study verified that there is a significant positive correlation between the emotion of “surprise”/“fear” and the hot discussion amount of the word “Covid-19,” indicating that there is indeed a connection between emotional factors and the dissemination process of hot words. This result can help bring clarity to the current social situation and its effects on public psychology and illuminate the trends of social development. In addition, the research results can contribute to the development of language and society.

1. Introduction

A great variety of social media are currently spreading rapidly around the world. They combine the characteristics of instant sharing and interaction, which promote the dissemination of information on the Internet. The real-time hot search rankings in social media provide netizens with massive real-time hot information. In Chinese social media, much hot information is usually expressed in short Chinese form, such as phrases or the names of people, events, and things. They are often derived from hot social events and are key words with representative significance. As the attention and discussion of netizens increase, these words appear frequently on the Internet and become hot words. Hot words often reflect the problems and phenomena that people are generally concerned about at a certain period of time [1]. They reflect social emotions to a certain extent and help collect public opinion. Therefore, hot words are a research object not only in linguistics but also in many other fields, including sociology, communication, and psychology.

Chinese researchers are adept at summarizing the reasons for the dissemination of hot words from the characteristics of the word itself, the characteristics of the virtual society on the Internet, and the characteristics of the general psychological pursuits of netizens. Lu (2013) maintained that the
reason for the dissemination of hot words is that hot words have one of the characteristics of pictogram, homophony, or carrying important information [2]. Ma (2015) proposed that the network platform is an ideal virtual society, and its anonymity and liberalization provide netizens with ample space to play, allowing them to break the traditional language norms and create many hot words [3]. Zong (2014) discovered that, due to the common psychological pursuits of netizens, such as “shocking,” “kidding,” and “copycat,” hot words can be disseminated [4]. The above viewpoints emphasize the dissemination premise of some special hot words, but they cannot explain the dissemination of common hot words, such as phrases or the names of people, events, and things. Moreover, they cannot explain the specific dissemination process, such as the appearance, disappearance, or stability of hot words. Clarifying the dissemination process can help explain the propagation of all hot words, including common words, and also helps explain how the current social situation relates to public psychology, illuminating the trends of social development. This is necessary to stabilize future social development. Meanwhile, the research results can contribute to the development of language and society. Therefore, this paper focused on the dissemination process of hot words.

Hot events will cause emotional changes among people, and emotions will also spread widely on social media platforms [5,6,7,8]. This paper assumed that the factor of “emotion” plays a role in the dissemination of hot words, which can explain their specific dissemination process. In order to confirm this conjecture, our research took the global outbreak of COVID-19 in 2020 as a background example and selected “Covid-19” as a keyword to investigate. This study mainly compared and summarized the connection between two sets of data on China’s Sina Weibo [9]. One was the hot discussion amount of the word “Covid-19” on Weibo, while the other was the emotions behind netizens’ comments under the hot topic information related to the word “Covid-19” on Weibo. Both sets of data were queried and searched based on Chinese words. The goal of this paper was to clarify the connection between the emotions of netizens and the dissemination process of the word “Covid-19” on Weibo.

2. Data

2.1. The Hot Word “Covid-19” and the Hot Discussion Amount

The word “Covid-19” in Chinese does not have any special pronunciation, meaning, or structure. This word became hot suddenly. When a hot word suddenly appears, some research summarizes it as a “bursting type.” Usually, these words are disseminated because they are mentioned on TV, in the news, or in magazines and then become hot topics on various platforms on the Internet [10]. The dissemination of words such as “Covid-19” usually occurs at a relatively precise point in time and has significant dissemination characteristics, holding great significance for exploring the spreading process of hot words.

Hot discussion amount refers to the frequency of hot words mentioned by netizens on the network platform. This paper observed the hot discussion amount of the word “Covid-19” on Sina Weibo, a social media platform in China. Currently, there are more than 500 million monthly active users. An increasing number of people rely on the convenience of Weibo to obtain and share information or express opinions. Weibo provides rich data on the attention and dynamics of the Chinese public [11]. Therefore, the hot discussion amount of hot words on Weibo is representative and can directly show its effect on dissemination. “Micro Index” [12] on Weibo is a special statistical analysis tool that can
calculate the daily hot discussion amount of hot words on Weibo based on the behavioral data of netizens, and display the hot discussion trend with a visual graph.

By searching and tracking hot discussion amount in the “Micro Index,” we found that in the period before January 23, 2020, the hot discussion amount of “Covid-19” was extremely low, approaching 0. This may be related to the fact that the word “Covid-19” had not been officially established. From January 23 to February, the overall hot discussion amount showed a clear upward trend. This may be related to the increase in media exposure after the epidemic entered the outbreak period, which led to a significant increase in public attention. After entering March, although a high amount of hot discussion had been maintained, the overall hot discussion amount showed a downward trend. This may be related to the decline in public attention after the epidemic eased. After March 31st, the overall hot discussion amount stabilized. To explore the significant characteristics of dissemination, this study focused on the analysis of the fluctuation period when the overall hot discussion amount rose and fell. We selected the period from January 23 to March 31, 2020 for observation, and in combination with the data of the hot discussion amount of each day, Figure 1 was created. It can be seen from Figure 1 that the hot discussion amount fluctuated over time, which means that the word “Covid-19” had indeed seen a certain dissemination on Weibo.

![Figure 1. Hot discussion amount of the word “Covid-19” on Weibo.](image)

2.2. Comments and Emotion Analysis

The comments collected in this paper are from Weibo. These comments are netizens’ remarks under the hot topic information related to the word “Covid-19.” Comments often contain netizens’ emotions, such as their attitudes toward, and opinions and evaluations of, current events, situations that affect people's lives, corporate development, and even government behavior. Through emotion analysis of comments, the emotional orientation of netizens can be extracted. This is conducive to understanding the overall trend of public opinion and is of great significance for investigating social trends and stabilizing social development. In emotion analysis, the classification of emotion is critical. Regarding emotion classification, Plutchik’s theory [13] pointed out that emotion is composed of eight basic pure emotions that are mixed to derive other emotions. The basic emotions are anger, fear, sadness, disgust, surprise, anticipation, trust, and joy. Ekman put forward six types of emotions: happiness, sadness, anger, fear, disgust, and surprise [14]. On the basis of Ekman, Xu et al. added “love” and proposed seven types of emotions for Chinese emotion analysis: happiness, love, sadness, anger, fear, disgust, and surprise [15]. According to the differences in emotional intensity and
Complexity, the seven types of emotions can be refined into several main emotional expressions. “Happiness” includes the feeling of ease; “love” includes “respect,” “praise,” “believe,” and “wish,” and “sadness” includes a disappointed feeling. “Anger” refers to a furious feeling; “fear” includes a feeling of panic, and “disgust” includes a feeling of boredom. Finally, “surprise” encompasses a feeling of being dumbfounded. This paper used the NLPIR-ICTCLAS [16] Chinese lexical analysis system for emotion analysis. This system is multi-functional, supporting such functions as Chinese word segmentation, new word identification, keyword extraction, and emotion analysis. The emotion analysis function of this system is rich in emotion classification, which is based on the seven types of emotions mentioned above. At the end of the analysis, the percentages of these seven emotions were displayed.

We used data collection software to collect hot topic information related to the word “Covid-19” from Weibo from January 23 to March 31, 2020. A total of 439,993 comments were collected from these hot topic information sources. We used the NLPIR-ICTCLAS Chinese lexical analysis system to conduct a comprehensive emotion analysis of the comments of each day. Chinese expressions are diverse, and the semantics of praise and criticism are difficult to judge. In order to avoid a certain impact on emotion analysis, this study screened out in advance some modal particles in the comments that were likely to cause ambiguity, such as “hehe.” We combined the emotion percentage data of the comments for each day to make Figure 2. It can be seen from Figure 2 that the seven emotions account for a certain proportion and fluctuated continuously over time, which means that the COVID-19 epidemic had indeed caused complex emotional changes among people.

Figure 2. The percentages of the seven emotions.

3. Data Analysis

3.1. Data Partition

Combining Figure 1 and Figure 2, it can be seen that the hot discussion amount of the word “Covid-19” and the emotions of netizens fluctuated constantly over time. In order to analyze the connection between these two sets of data more clearly, it was necessary to clarify several major time-varying stages to reflect the specific dissemination process of hot words.

According to the information provided in the white paper “Fighting COVID-19: China in Action,” [17] we can understand the time characteristics of the spread of the COVID-19 epidemic in China. The epidemic began roughly at the end of January 2020, broke out in mid-February, and eased in
mid-March. During the whole process, there are three popular events that can specifically represent these time characteristics. On January 23, Wuhan was locked down. On February 12, 15,152 newly confirmed cases were reported nationwide (including 13,332 clinically diagnosed cases in Hubei Province). On March 11, the number of new confirmed cases nationwide dropped to single digits. This paper used these three events as dividing lines to separate the dissemination process of the word “Covid-19” into three stages. The first stage is “January 23–February 12,” the second is “February 13–March 11,” and the third is “March 12–March 31.”

3.2. Correlation Analysis

We used correlation analysis to study the correlation between hot discussion amount and the emotions of happiness, love, anger, sadness, fear, disgust, and surprise. With this information, we made Table 1.

The three stages of hot discussion amount are marked as hot discussion amount ①, hot discussion amount ②, and hot discussion amount ③ in order of priority. From Table 1, it can be found that in the first and second stages, significant correlations are shown. Based on these significant correlations, we made Figure 3. Combining Table 1 and Figure 3, it can be seen that in the first stage, there is a significant positive correlation between hot discussion amount and “surprise.” In the second stage, there is a significant positive correlation between hot discussion amount and “fear.” There is only weak correlation, or even irrelevance, among the remaining unmentioned data.

|               | happiness | love     | anger | sadness | fear | disgust | surprise |
|---------------|-----------|----------|-------|---------|------|---------|----------|
| hot discussion amount ① | -0.028    | -0.128   | -0.190 | 0.186   | -0.338| 0.014   | 0.810**  |
| hot discussion amount ② | 0.005     | -0.316   | 0.264  | -0.229  | 0.811**| 0.396*  | -0.241   |
| hot discussion amount ③ | -0.206    | 0.123    | -0.113 | 0.234   | -0.079| -0.124  | -0.027   |

* p<0.05  ** p<0.01

![Figure 3](image_url)

Figure 3. (a) The connection between “surprise” and hot discussion amount. (b) The connection between “fear” and hot discussion amount.

3.2.1. The First Dissemination Stage of the Word “Covid-19”

From January 23 to February 12, the positive correlation between “surprise” and hot discussion amount showed that the greater the proportion of “surprise,” the higher the hot discussion amount of the word “Covid-19,” which meant the better the dissemination effect of this word. In this stage, we can trace the reasons for the leading role of “surprise” to the major event that occurred on January 23. Before January 23, netizens did not have extensive knowledge of or concern about the COVID-19
epidemic. However, netizens began paying a high degree of attention to it when after the outbreak, the city of Wuhan was immediately closed on January 23. Because of this rare situation, netizens realized the infectious power of COVID-19 and were surprised by the epidemic. Therefore, the emotion “surprise” generated by netizens during this period is consistent with the actual social situation.

3.2.2. The Second Dissemination Stage of the Word “Covid-19”
From February 13th to March 11th, the positive correlation between “fear” and hot discussion amount showed that the greater the proportion of “fear,” the higher the hot discussion amount of the word “Covid-19,” which meant the better the dissemination effect of this word. In this stage, we can explore the reasons for the leading role of “fear” from the major event that occurred on February 12, when according to the white paper, the number of new cases was the highest in one day, reflecting that the epidemic had reached a grim state at that time. Netizens became frightened due to the out-of-control epidemic. The outbreak of the epidemic put everyone at risk of infection, and the “fear” emotion of netizens continued to rise.

3.2.3. The Third Dissemination Stage of the Word “Covid-19”
From March 12 to March 31, there was no significant correlation between emotions and hot discussion amount. Although there was no dominant emotion during this period, it cannot be completely concluded that emotions had nothing to do with hot discussion amount. According to the white paper, the number of newly confirmed cases nationwide fell to the single digits on March 11. Compared with the outbreak period, this meant that the epidemic had almost come under control. In this situation, netizens became relaxed, and it is completely understandable that the overall emotions stabilized.

4. Conclusion
This paper summarizes the connection between the hot discussion amount of the word “Covid-19” and the emotions of netizens on Weibo, and explored the dissemination process of the word “Covid-19” through three main periods. It was found that, especially when the overall hot discussion amount was relatively high, the dominant emotions of “surprise” and “fear” could be detected, indicating that there is a connection between emotions and the dissemination process of hot words. In addition, the dominant emotions were all negative. It can be speculated that negative emotions may have a greater impact on the dissemination process of hot words. Although it was not the focus of this analysis, it could be seen that, among the seven emotions, “love” always accounted for a high percentage. This means that the overall emotion during the COVID-19 epidemic remained optimistic. During the outbreak of the COVID-19 epidemic in China, many admirable heroes were born. The timely action of the Chinese government made people willing to believe and hope that the prospects would improve. On the basis of this research, some problems remain to be solved. First, it is necessary to make long-term observations of netizens’ emotions and the dissemination process of hot words. Second, in order to summarize the commonality of related connections, we should observe multiple hot words in the future.

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