

A Cross-Cultural Analysis of Sentiment in “COVID-19” Reportage of *CCTV News* and *The New York Times*

TAN Yiyan^[a]; YANG Wenhui^{[b],*}; WANG Yiran^[b]; LI Xinye^[a]

^[a] International College, Guangdong University of Foreign Studies, Guangzhou, China.

^[b] School of English for International Business, Guangdong University of Foreign Studies, Guangzhou, China.

*Corresponding author.

Supported by the Guangdong Provincial Planning Project of Humanities and Social Sciences (No. GD22XWY02).

Received 27 July 2022; accepted 30 September 2022
Published online 26 December 2022

Abstract

Drawing support from the artificial intelligence platform of Baidu Cloud and the natural language processing approach, this paper provides an empirically-grounded micro-analysis of Sino-American news discourses on “COVID-19” pandemic in China 2020 by using keyword wordcloud analysis on sentiment expressions, namely the discourses from the websites of *CCTV News* and *The New York Times*. The authors analyzed the media’s intended attitudes expressed with sentiment, and found that the attitude of the Chinese people and China’s media towards the epidemic was mostly positive; while *New York Times* was mostly negative about the epidemic, especially at the peak of the outbreak. Such a difference presents a prevalent manifestation of recognition towards the epidemic led by either government or media institutions while people face uncertainties caused by corona virus, which may further influence the public opinion and attitudes towards the epidemic, which in turn has broader social/political-interactive purposes and public cognitive construction.

Key words: Sino-American news reports; COVID-19 pandemic; Epidemic; Attitude; Sentiment expressions

Tan, Y. Y., Yang, W. H., Wang, Y. R., & Li, X. Y. (2022). A Cross-Cultural Analysis of Sentiment in “COVID-19” Reportage of *CCTV News* and *The New York Times*. *Cross-Cultural Communication*, 18(4), 31-40. Available from: <http://www.cscanada.net/index.php/ccc/article/view/12849>
DOI: <http://dx.doi.org/10.3968/12849>

1. INTRODUCTION

Since December 2019, several cases of unexplained pneumonia, which all had an exposure history to a seafood market, have been found in some hospitals in Wuhan, Hubei Province. Subject to the investigation, this acute respiratory infectious disease confirmed to be caused by a sort of novel corona virus. World Health Organization (WHO) named the novel corona virus-infected pneumonia “Corona Virus Disease 2019” (COVID-19) on 11 February 2020. The virus is very easy to infect. In a short period of time, patients with corona virus pneumonia have appeared all over China and some foreign countries. WHO believes that the current outbreak of COVID-19 can be called “pandemic” on 11 March 2020. On account of the concerted efforts of the whole nation, the domestic epidemic situation has been effectively controlled, while the international situation is not optimistic all the same. The sentimental expressions would pose great concerns for how people facing pandemic at initial stage.

In an era of information explosion, people can obtain all kinds of information from various channels. Due to the restriction of epidemic situation, the Internet has become one of the important sources of information about COVID-19, which affect and, meanwhile, reflect people’s cognition (Yu, 2022), ideology (Alafnan, 2020) and attitudes (Yu, 2021). Social networks, forums and blogs are developing rapidly on the Internet, which constructs information bank, while the massive amounts of data on the Internet also convey important social and political messages, reflecting news discourse writer’s intention and attitudes towards the information, and further constructing the public cognition and communication. Therefore, analyzing discourses and mining information occupies an increasingly important position because social media is a tool for assessing public response and disseminating accurate community-level information, which can extract information related to public mental conditions (e.g.

Homan, et. al., 2014). Therefore, based on 60 pieces of authentic news reports by two media institutions both in China and the US, the authors conduct a research on the severe pandemic in 2020 by focusing on sentiment expressions so as to reveal the trends of media attitudes and intended cognitive construction in the two societies from a perspective of computational analysis.

2. LITERATURE REVIEW

2.1 Cross-Cultural Studies of News Reports

News reports are used to describe information disseminated through the media, such as newspapers, radio and television. It is a style of recording society, spreading information and reflecting the era. News reports, as a kind of discourse was discussed by van Dijk (1990), imply some particular concepts: new information about events / things / persons, a (TV or radio) program type in which news items are presented, news item or news report (i.e., a text or discourse on radio, on TV or in the newspaper) in which new information is given about recent events. Bennett (2007) defined “news discourse” from the perspective of journalism, who claimed that news was the information which was timely and relevant to the concerns of its audiences, and it presented in an easy-to-grasp form. The classification of news reports can also be determined according to different criteria. For instance, news reports can be divided into international and domestic news based on regions and scopes of the events. In the light of natures and contents, news reports can also be associated with political, technological, economic, military, social, cultural issues and so on.

With the endeavors of journalists and linguists, many achievements have been made in the study of news discourse. As a linguist, Yang (2020: 13) divided the study of news discourse into three major categories: content analysis, an essential research approach, which is systematic, objective and qualitative, to new studies; discourse analysis, a research approach to make up for the limitations of content analysis. Linguists begin to shift their attention from text to context and rely on qualitative data to conduct research. “It dynamically analyzes texts and seeks for the hidden drives behind them, which includes certain kind of encyclopedic knowledge, social cognition, cultural variation and so on.”; contrastive analysis, an analytical approach to news analysis that takes into account different cultural contexts which embody in language. For instance regarding the latter one, Scollon, et al., (2000) compared news discourse in Chinese and English to observe the different ways to utilize quotations. News reports on political events have always been the focus of linguists’ cross-cultural studies. Zhou (2012) conducted a critical discourse analysis of news reports about the death of Kim Jong-il released

on China and foreign media. By revealing the ideology beneath these news reports, she aimed to discuss the relationship between media and government, foreign policy and national interests. With regard to social news analysis, He and Zhou (2015) probed into the lexical choice of six pieces of news reports in *China Daily* and *The Washington Post*, which were related to three safety accidents in China. Using the framework of Halliday’s (1985) systematic functional grammar, scholars analyzed the differences of lexical choice and verbal messages in order to reveal the hidden and unknown ideology embedded in news reports. For example, by focusing on stance markers, Yang et al. (2020) conducted a cognitive study on smog news in China and America to dig into their represented cognitive mechanism. They found that the stances presented in Chinese smog news were principally dominated by officials and governments while American smog news characterized professional and public stances with pervasive individual tones, attitudes, and dictations. Another kind of social news discourse, which relates to unpleasant major events or disasters, also attaches great attention to linguists. Concerning the Sichuan earthquake of May 2008, Liu and Stevenson (2013) selected social news in a Chinese newspaper, an Australian Chinese newspaper, and an Australian newspaper, and applied the attitude subsystem of Appraisal framework proposed by Martin & White (2005) to examine stance in cross-cultural contexts. Their research revealed that the stances in the three newspapers had systematic functional differences. In relation to another big event, such as the snow disaster happened in China in 2008, Yuan (2009) compared two news reports released on *The New York Times* and *China Daily* to conduct a contrastive critical discourse analysis. She found that American media had described the extent of the snow disaster far more seriously than Chinese media had described, showing a fragile image of China.

Medical or public-health news reports are important part in newspapers, especially in recent years because people are concerned with their health and public health development worldwide. One of the subject matters reported in this kind of news is epidemic situation update, which purpose is to bring the public the latest information on epidemic situations. While Tang (2017) chose news on bird flu as the typical example of news of epidemic situation update to conduct a linguistic research based on systemic functional grammar and genre theory, and analyzed the ideational and interpersonal features of eventuality, and how these features constructed the ideology behind news reports, Alafnan (2020) and Yu (2021, 2022) place their research interests in recent occurred COVID-19 pandemic to analyze bias, ideology, attitudes and cognitive metaphors identified in news reportage to interpret the cross-cultural differences. Nevertheless, for the deficiency of contrastive and statistic analyses on public-health and medical news, and few

scholars being involved in the field of natural language processing, the present study combines linguistics, computer science together with mathematics to analyze the public news discourses on epidemic virus to reveal concrete evidences for cognitive construction exposed in media. Therefore, we intend to employ a sentiment analysis and a widely applied text mining techniques to conduct a cross-cultural study of news reports on the major public-health event happened in 2020.

2.2 Studies of Sentiment

Sentiment analysis (SA), also known as opinion mining, refers to the use of computing technologies to excavate and analyze subjectivity, objectivity, opinion, emotion and polarity of texts, and classify the sentiments of them (Yang, et al., 2013). One of the elemental issues in sentiment analysis is to identify how sentiments are expressed in texts and whether these expressions imply positive or negative attitudes toward the subject. Nasukawa & Yi (2003) argued that sentiment analysis involves identification of: sentiment expressions, polarity and strength of the expressions, and their relationship to the subject. For example, in the sentence, “He has now overtaken her in the rankings”, the expression “overtake” is a positive sentiment toward “he” and a negative sentiment toward “her”.

As a sub-field of Natural Language Processing (NLP), sentiment analysis has become one of the hot issues in information retrieval, data mining and so on. Over the last two decades, numerous works have explored sentiment analysis in different applications and using different approaches (Sanchez-Rada, Iglesias, 2019). Xu, et al. (2019) used the method of text sentiment analysis based on a sentiment dictionary. And the extended sentiment dictionary contains HowNet (Qin & Petrounias, 2017), NTUSD, and the internet vocabulary. By utilizing the extended sentiment dictionary and the designed sentiment score rules, the sentiment of the text is achieved. Lu, et al (2018) proposed a different approach which combined the Attention Mechanism, Bidirectional Long Short-Term Memory Network, and Lexicons for sentiment classification, while Maia, et al. (2018) used a sentiment-based prediction model for the financial domain which used the combination of a clausal/phrasal sentence simplification step, and a complex sentence was simplified into syntactically sound independent shorter sentences which were then classified according to the polarity and a distant supervision step for large-scale polarity lexical acquisition. Meanwhile, Chen, et al. (2018) proposed an analytical model combining convolutional neural network, which was a typical algorithm of deep learning, and regional attention mechanism. In this model, a sentence was centered on the evaluation goal, extending a certain length to the left and right sides, cutting sentences, and using data sets in different fields for sentiment analysis.

Generally, there are two main approaches in the field of sentiment analysis (Shi, et al., 2019) so far. One is an unsupervised learning approach based on sentiment lexicons and rules. However, in the case of complex semantics, sentiment lexicons cannot distinguish the semantics of various words well, and there are many mistakes. While the sentiment analysis based on machine learning can solve this situation better (Sanchez-Rada & Iglesias, 2019). Another one is a machine learning method based on supervision mechanism. This method is characterized by words or short sentences to train, and combined with a learning model to form a training model, and analyzes the test sets last. As for analytical procedure, Zhou et al. (2008) proposed several steps for solving a basic and typical sentiment analysis problem. The first step was data collecting. Most of the sentiment analysis data were collected from the Internet, such as news sites and professional comment sites. The second step was data preprocessing, which aimed to reduce interference and improved the accuracy of classification. The third step was sentiment word extraction and selection, the most essential process in sentiment analysis. In analyses, sentiment words are called polarity words and evaluation words; especially refer to words with sentiment tendency. Under normal conditions, sentiment words have two kinds of preferences: positive and negative. Words extraction is the groundwork of sentiment analysis, and this work can be done by sentiment lexicon and corpus up to now (Yang, et al., 2013). Words extraction based on sentiment lexicon is to obtain the evaluation words by analyzing the semantic connection between words. The lexicon here generally refers to the use of WordNet or HowNet, etc. Li and Liu (2012) extracted adjectives and adverbs from data and compared them with WordNet to select sentiment words; word extraction based on the corpus method mainly relied on the statistical characteristics of a large corpus. Other researchers dug up evaluation words in corpus and judged their polarity through some phenomena (Zhao, et al., 2010). For instance, Hatzivassiloglou & McKeown (1997) extracted a large number of adjective evaluation words from the large corpus Wall Street Journal because some scholars had discovered that two adjectives were connected by conjunctions, such as “and” or “but”, and their polarities also had connections. Generally, the adjectives connected by “and” (e.g. beautiful and magnificent) own the same polarity, while the adjectives connected by “but” (e.g. lovely but untamed) show the different polarities. The last step of sentiment analysis is sentiment classification, which usually applies a standard classifier based on machine learning.

People’s cognition is always embodied in language, and one of the ways to express human sentiments is through language. Thus, sentiment analysis is a very effective means for studying psychological cognition of

remarkable. Since it was designed by Guido Van Rossum in 1989, it has become the three most widely used cross-platform scripting languages along with Tcl and Perl (Cicekli, 2010) for over ten years' development. With the characteristics of portability, adaptability, extensibility, object-oriented, and easy to maintain learning and reading, python is increasingly accepted and loved by programmers and software enthusiasts. Owing to the advantages of python mentioned above, this paper applies python language coding to conduct the sentiment analysis of news reports on COVID-19 issued from January to June in 2020. The concrete steps are listed in Table 2.

Table 2
The python analytical procedure

Steps for python program	Methods used for data set preparation
Step 1	Collect training data sets, and train them through Baidu AI to form a training model which is connecting to Baidu AI via parameters. The corresponding APPID, API Key and SECRET KEY are obtained after the training model is established.
Step 2	Select the news reports of COVID-19 as test data sets. The authors grab the required reports from <i>CCTV News</i> and <i>The New York Times</i> respectively, and store the information of these reports, which includes titles, contents, writers and publishing time, etc. with certain naming rules.
Step 3	Use pandas to define the data frame which consists of serial numbers, time, positive probability, negative probability, sentiment value and confidence value.
Step 4	Conduct sentiment analysis of every news report that conforms to the naming rule through the loop statements. Public opinion analyses of Baidu should exceed 2047 bytes at a time, thus we cut each report into a block of 500 characters and calculate its sentiment value.
Step 5	Classify the sentiment expressions by the training model of Baidu AI when the characters of a report are less than 500, and output the corresponding positive probability, negative probability, sentiment value and confidence value. Then process the first 500 characters and store the corresponding results, and use the loop for the statements to manage the rest N 500 characters (N≥1). Finally, get the arithmetic mean of the positive probabilities, negative probabilities and confidence values. Due to sentiment value is naming data and cannot take the average, so it is determined by the highest frequency one.
Step 6	Adopt pyplot of matplotlib to conduct the single analysis and comparative analysis of positivity, negativity and sentiment of the test data, and then form charts. Then, a performable program which can conduct sentiment under the Windows environment is generated.
Step 7	Extract and analyze wordcloud keywords of every news report with a loop for the statements. The authors read the pause words first, and cut reports by using jieba, and then use the wordcloud and pyplot to the graph. Ultimately, the authors get the wordcloud keyword analysis of reports.

Specifically, the coding work is based on Python language, which combines with a third party toolkit to develop the test design.

3.3 Method and Analytical Process

The authors used SA, which is one of the most widely applied text mining techniques for news (Pang & Lee, 2008), to analyse the Chinese discourses issued in two contexts. SA is a sub-field of NLP (Natural Language Processing), which is to analyze a text to determine whether it is negative or positive emotionally (Karami, et al., 2018). The positive annotation is from 1 to 2, the negative annotation is from 0 to 1 (Rill, et al., 2014; Agarwal, et al., 2018), and the neutral value is 1. Judging a text's sentiment needs to accumulate the lexical sentiments used in a discourse. This approach may not only fail to guarantee the confidence and accuracy, but also may lead to erroneous conclusions. To accommodate this deficiency, the authors used an emotional analysis model of natural text processing of Baidu AI in this paper, which had a supervised machine learning model with a high-quality manual annotation function. Sentiment analysis, in the experiment, was based on classifying the text contents and drawing an emotional score. We used the approach of Baidu artificial intelligence cloud API (Arulmurugan, et al., 2019) to train more than 8000 positive and negative words or sentences to form a unique training model, then analyzed the texts and returned four values based on the following parameter, which represented the credibility of the first three values, and the larger the value, the higher the credibility.

$$\begin{aligned}
 & \text{sentiment} && 0 = < n < = \\
 & && 2 \quad \text{(i)} \\
 & p + n = 1 & 0 = < p < = 1 & 0 = < n < = 1 \quad \text{(ii)} \\
 & & c & 0 = < c < = 1 \quad \text{(iii)}
 \end{aligned}$$

The parameter was illustrated as: i) sentiment, the positive value was 1-2 (the greater the value, the more positive it was). The neutral value was 1 and the negative value was 0-1 (the smaller the value, the more negative it was); ii) positive probability (p), the range of values was from 0 to 1, if it exceeded 0.5, the positive probability of the text was higher than the negative probability, and as for negative probability (n), the range of values was from 0 to 1, if it exceeded 0.5, the negative probability of the text was higher than the positive probability; iii) confidence (c), its range of value was from 0-1. The analytical procedures followed the steps listed in section 3.2.

4. FINDINGS AND DISCUSSION

4.1 Sentiment Orientations in CCTV News and The New York Times

The authors tested related reports of *CCTV News* and *The New York Times* on the same training data set, and analyzed the positive probability, negative probability

of 30 pieces of diaries and made a comparison of them. In Figure 3, the red curve was the positive tendency probability of *CCTV News*, and the green one was the negative tendency probability of it. It could be seen from the diagram that the positive sentimental tendency was greater than the negative sentimental tendency in most cases. In the 16th diary, the positive sentimental tendency peaked on 11 June, with the news entitled “Palestine: Attach importance to China’s valuable experience in

fighting COVID-19”. In the 22nd diary, which was released on 17 June, the negative sentimental tendency reached the maximum, and this news was entitled “Twists and turns! There is no evidence to support salmon infection with COVID-19.” According to the two diaries of *CCTV News*, in June, Chinese people, on the one hand, were happy with effective control of the epidemic, and on the other hand, they expressed concerns about the imported foods contaminated novel corona virus from abroad.

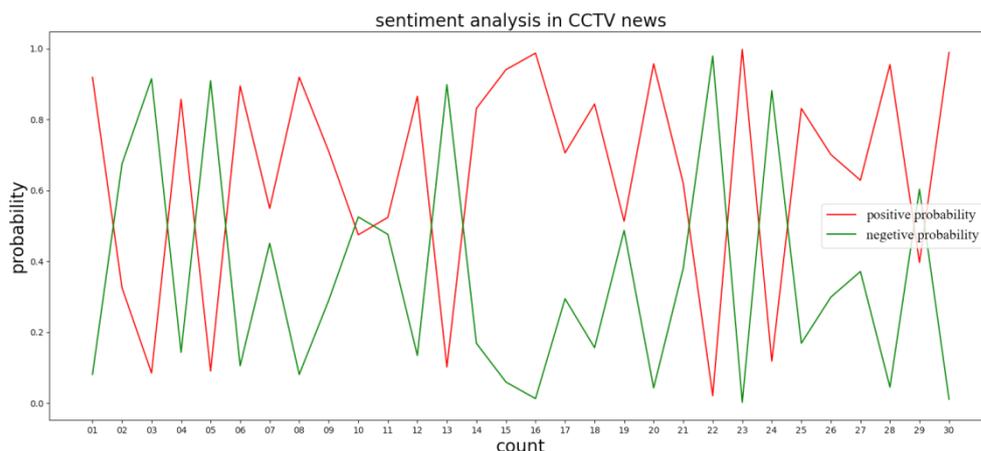


Figure 3
Line chart of sentiment analysis in *CCTV News*

In Figure 3, the red curve was the positive tendency probability of *CCTV News*, and the green one presented the negative tendency and probability. Regarding the details, the authors made a line chart shown as Figure 3, the positive probability of *CCTV News* was 22/30 and the

negative probability was 8/30. To classify the resources of *CCTV News*, the authors concluded that most of the Chinese people and the Chinese media were positive about the epidemic at that time.

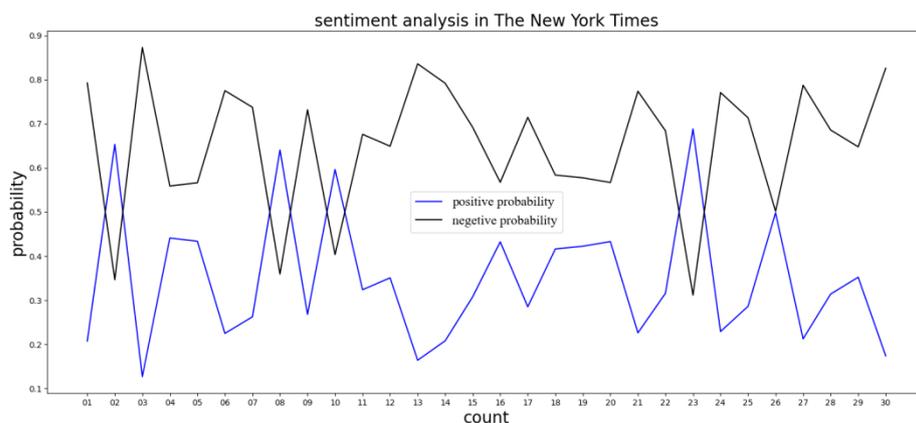


Figure 4
Line chart of sentiment analysis in *The New York Times*

In Figure 4, the blue curve showed the positive tendency and probability of *The New York Times*, and the black one showed the negative tendency and probability. Most data showed that the value of the black curve was greater than the value of the blue one, which indicated that the media tended to be negative during that period. In the

3rd diary, the negative sentimental tendency reached the maximum because of the news issued on 2 March, entitled “Will the novel corona virus patients be infected again after cure?” In the 23rd diary, positive sentimental tendency peaked on 15 June, with the news entitled “Batman, the world needs in the pandemic era”. The positive probability

of *The New York Times* was 4/30, the negative probability was 25/30, and 1/30 was neutral. As shown in Figure 4, *The New York Times* was mostly negative about the epidemic, especially at the time of the outbreak.

Generally, most CCTV News had a positive attitude towards the epidemic in the first outbreak, and had a stable and sustained positive attitude towards COVID-19, while the negative attitude was awash in most *The New York Times* from March to June in 2020, and the negative sentiment persisted. However, such sentiment differences gave rise to the confusion among the Chinese due to the information asymmetry, which further caused dissident voices even within China, a typical example was Fangfang's Diary published on internet in China in 2020, and later translated and published in the US and Germany. The confusion has lasted for months and arisen

great concern from the Western countries. One fact is that, positive sentiment and its affection to the public not only let down governments' guard to the pandemic at initial stage, but also lightened Wuhan people's hearts on its impact, which surely caused poor-/non-preparation for the quarantine and lock down of the city. Some chaos and distrust of government eventually took place in Wuhan. In this case, positive sentiment do give rise to optimistic cognition on COVID-19 pandemic.

4.2 Sentiment Values in CCTV News and *The New York Times*

In this section, the authors compared the positive and negative sentiment value in *The New York Times* and *CCTV News*, together with the emotional tendency in the discourses.

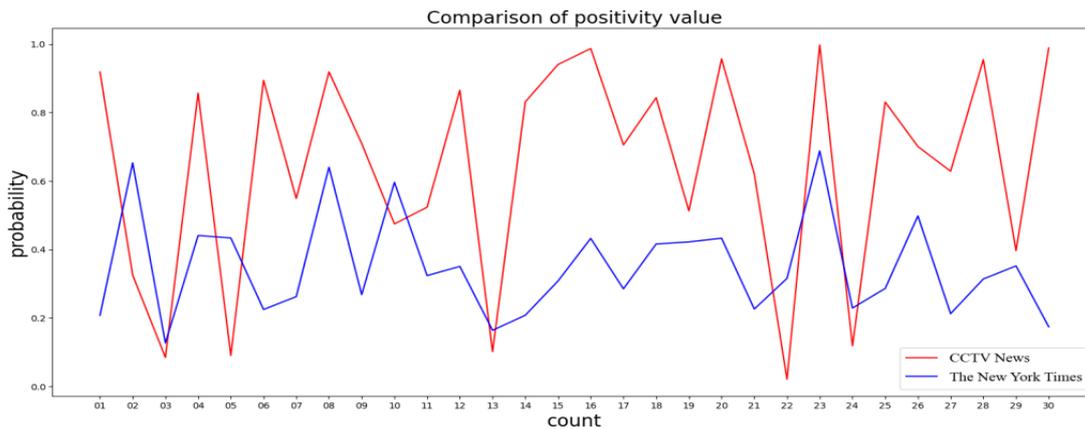


Figure 5
Comparison of positivity value

Figure 5 shows the negative degree of *CCTV News* and *The New York Times*. The red and blue curves in the figure represent the positive probability of *CCTV News* and *The New York Times* respectively. The red curve is above the

blue one for most of the time, presenting that the positive sentimental tendency of *CCTV News* is higher than that of *The New York Times*.

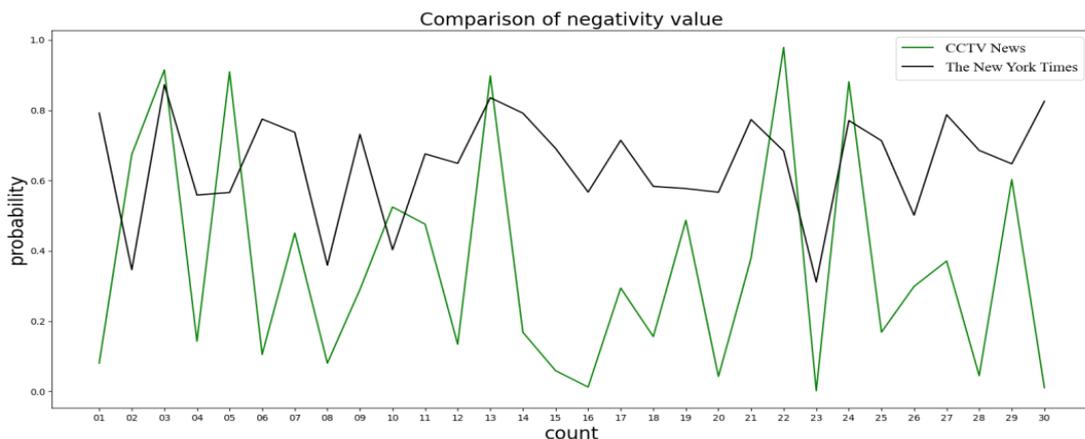


Figure 6
Comparison of negativity value

Figure 6 is a comparison of the positive probability of *CCTV News* and *The New York Times*. The green and black curves display the negative degree of *CCTV News* and *The New York Times* respectively. The black curve occupies the upper position for most of the time, indicating that the negative sentimental tendency of *The New York Times* is higher than that of *CCTV News*. The curve tendency demonstrates that between 13-21 diaries, the positive sentimental tendency of *CCTV News* remained relatively stable, while the negative sentimental tendency of *The New York Times* continued to be depressed. During that period, the two media institutions had different sentimental tendencies towards the outbreak and control of the epidemic.

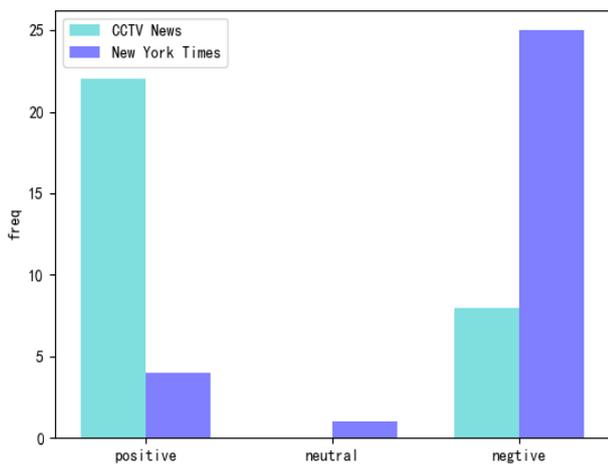


Figure 7
Comparison of sentiment values in *CCTV News* and *The New York Times*

Concerning the differences of sentiment values, the authors found that the affection centeredness of the *CCTV News* data captures the news related to “novel coronavirus”. As illustrated in Figure 7, *CCTV News* presents over 20 positive sentiments and 8 negative ones, while *The New York Times* showed 4 positive sentiments, 1 neutral and 25 negative ones, as shown in Figure 7. Positive probability of the neutral new equals to negative probability, and equals to 0.5, and the sentiment value equals to 1. Thus sentiment of the new is neutral. Interestingly in this data, the neutral sentiment expressions are rarely identified in *CCTV News*, while in the discourses of *The New York Time*, there is only one neutral sentiment news was identified, which entitled “New ‘ally’ of Chinese animal rights activists: novel corona virus” issued on 24th June 2020.

According to the data analysis, the proportion of positive sentimental tendency in *CCTV News* is 73.3 and that in *The New York Times* is 13.3. Through the wordcloud analysis of keywords (Carvalho, et al., 2016; Oesper, et al., 2011), the authors found the directions of media attention in different periods. The core issues of

CCTV News concern changed from the incident itself and how the relevant government departments took measures to building up confidence and helping the other disaster areas and countries. Optimism dominated the sentiment in *CCTV News*, and positive news constantly appeared in the development and maturity of the health events. *The New York Times* tended to be consistent to apply a negative sentiment in news during the outbreak and development of the epidemic, which might give rise to public negative sentimental polarization. The emergence of this phenomenon of collective negative sentimental consistency might further lead to public social insecurity.

In public health emergencies, the spread of social media is conducive to emotional comfort and cohesion (Song, et al. 2017). The sentiment results and its preferences further provided meaningful evaluation regarding COVID-19 in China by two media institutions, one was supported by the China’s central government, and the other one was managed by a private US institution, who offered implications for the intended public recognition of COVID-19 pandemic and its affection to not only the Chinese but also the people in the world. Either positive or negative attitudes embedded in the news reports on COVID-19 echoed the argument by Enfield and Wierzbicka (2002: 2-3): “While much work on emotion has assumed that English provides clear and non-ethnocentric terminology for the description of emotions in different ethno-linguistic spheres, some recent research has questioned this assumption. It has been shown that most linguistic categories (words, constructions) referring to emotions in natural languages embody complex and culture-specific configurations of ideas about how thoughts, feelings, and bodily processes may be normally (i.e., conventionally, in a given social realm) related.” Negative sentiment expressions might arise readers’ and governmental alertness and concern about pandemic while positive sentiment expressions might loosen readers’ vigilance and bring about negative social effects and improper corresponding resolutions.

Therefore, people’s knowledge of the world emerges from language use, and vice versa. Their language use leads to actions of social interaction. News writers construe their experience as it is obtained from institutions and society for the purpose of communicating that experience and attitudes to their readers, which in turn has broader social-interactive purposes. Likewise, the readers tend to construal the lexical choices or discourse for even broader social purposes (Yang et al., 2020: 158). By integrating computational analytical method, the cross-cultural differences of this research provide supplementary and statistical foundation for micro linguistic analysis on sentiments and psychological studies on human beings’ emotions and attitudes towards world pandemics, and their impacts on social, political and economic administration in a specific society.

5. CONCLUSION

A distinctive feature of this research is that while it shares an interest in trying to identify linguistic resources on which discourse writers rely in embodying sentiment, it does not treat sentiment as the product of individual opinions and attitudes accomplished through one-way linguistic mappings, i.e. mappings of certain linguistic forms onto the sentiment he or she wishes to put forward. Instead, like all other discourse actions, sentiment is treated as an emergent product which is shaped by, and itself shapes, the unfolding development of news discourses on specific issues in different cultural contexts. Such a linguistic difference concerning sentiment expressions presents that although the relationship between negative and positive attitudes has been recognized, the affection of sentiment expressions in news discourses to the public opinion should not be underestimated. For example, positive sentiment and its value might not bring about positive social and political effects. Thus, both individual and public attitudes may be piloted by discourse writer's sentiment expressions displayed in the unfolding course of daily news reports, and how such attitude-loaded and opinion-embodied sentiments may, in turn, be so oriented to by news discourse readers.

DECLARATION OF CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

REFERENCES

- Agarwal, A., Singh, R., & Toshniwal, S. D. (2018). Geospatial sentiment analysis using twitter data for uk-eu referendum. *Journal of Information and Optimization Sciences*, 39(1), 303-317.
- Alafnan, M. A. (2020). COVID 19 – The foreign virus: Media bias, ideology and dominance in Chinese and American newspaper articles. *International Journal of Applied Linguistics and English Literature*, 9(1), 56–60.
- Arulmurugan, R., Sabarmathi, K. R., & Anandakumar, H. (2019). Classification of sentence level sentiment analysis using cloud machine learning techniques. *Cluster Computing*, 22, 1199-1209.
- Bennett, W. L. (2007). *News: The politics of illusion* (7th Ed.). New York: Pearson.
- Carvalho, A. S., Rodríguez M. S. and Matthiesen, R. (2016). Review and literature mining on proteostasis factors and cancer. *Methods in Molecular Biology*, 1449, 71-84.
- Chen, S., Peng, C., Cai, L., & Guo, L. (2018). A deep neural network model for target-based sentiment analysis. In *Proceedings of the 2018 International Joint Conference on Neural Networks (IJCNN)*. Institute of Electrical and Electronics Engineers, 1-7. <https://ieeexplore.ieee.org/document/8489180>
- Cicekli, I. (2010). An introduction to language processing with perl and prolog. *Natural Language Engineering*, 16, 193-195.
- Enfield, N., & Wierzbicka, A. (2002). The body in description of emotion. *Pragmatics and Cognition*, 10, 1-25. <https://doi.org/10.1075/pc.10.12.02enf>.
- Fitri, V. A., Andreswari, R., & Hasibuan, M. A. (2019). Sentiment analysis of social media twitter with case of anti-lgbt campaign in Indonesia using naïve bayes, decision tree, and random forest algorithm. *Procedia Computer Science*, 161, 765-772.
- Halliday, M. A. K. (1985). *An Introduction to Functional Grammar*. London: Edward Arnold.
- Hatzivassiloglou, V., & McKeown, K. (1997). Predicting the semantic orientation of adjectives. In *Proceedings of the 35th Annual Meeting of the Association for Computational Linguistics and Eighth Conference of the European Chapter of the Association for Computational Linguistics*. Association for Computational Linguistics, USA, 174–181. <https://doi.org/10.3115/976909.979640>
- He, X., & Zhou, X. (2015). Contrastive analysis of lexical choice and ideologies in news reporting the same accidents between Chinese and American newspapers. *Theory and Practice in Language Studies*, 5(11), 2356-2365.
- Homan, C. M., Lu, N., Tu, X., Lytle, M. C., & Silenzio, V. M. B. (2014). Social structure and depression in Trevor Space. In *Proceedings of the 17th ACM conference on Computer supported cooperative work & social computing (CSCW 14)* (pp. 615-625). Association for Computing Machinery. <https://doi.org/10.1145/2531602.2531704>
- Karami, A., Bennett, L. S., & He, X. Y., (2018). Mining public opinion about economic issues: twitter and the U. S. presidential election. *International Journal of Strategic Decision Sciences*, 9(1), 18-28.
- Li, G., & Liu F. (2012). Application of a clustering method on sentiment analysis. *Journal of Information Science*, 38(2), 127-139.
- Liu, L., & Stevenson, M. D. (2013). A cross-cultural analysis of stance in disaster news reports. *Australian Review of Applied Linguis*, 36(2), 197-220.
- Lu, Y., Rao, Y., Yang, J., & Yin, J. (2018). Incorporating lexicons into LSTM for sentiment classification. In *Proceedings of the 2018 International Joint Conference on Neural Networks (IJCNN)*. Institute of Electrical and Electronics Engineers, 1-7. <https://ieeexplore.ieee.org/document/8489612>
- Maia, M., Freitas, A., & Handschuh, S. (2018). FinSSLx: A sentiment analysis model for the financial domain using text simplification. *2018 IEEE 12th International Conference on Semantic Computing (ICSC)*, 1, 318-319.
- Martin, J. R., & White, P. R. R. (2005). *The Language of Evaluation: Appraisal in English*. New York: Palgrave Macmillan.

- Nasukawa, T., & Yi, J. (2003) Sentiment analysis: Capturing favorability using natural language processing. In *Proceedings of the 2nd International Conference on Knowledge Capture, Florida* (pp.70-77). (<http://dx.doi.org/10.1145/945645.945658>)
- Oesper, L., Merico, D., Isserlin, R., & Bader, G. D. (2011). Wordcloud: A cytoscape plugin to create a visual semantic summary of networks. *Source Code for Biology and Medicine*, 6(1), 7-10.
- Pang, B., & Lee, L. (2008). Opinion mining and sentiment analysis. *Foundations and Trends in Information Retrieval*, 2, 1-135.
- Qin, Z., & Petrounias, I. (2017). A semantic-based framework for fine grained sentiment analysis. *2017 IEEE 19th Conference on Business Informatics (CBI)*, 1, 295-301.
- Rill, S., Reinel, D., Scheidt, J., & Zicari, R. V. (2014). Politwi: early detection of emerging political topics on twitter and the impact on concept-level sentiment analysis. *Knowledge-Based Systems*, 69, 24-33.
- Sanchez-Rada, J. F., & Iglesias, C. A. (2019). Social context in sentiment analysis: Formal definition, overview of current trends and framework for comparison. *Information Fusion*, 52, 344-356.
- Scollon, R., Scollon, S. W., & Kirkpatrick, A. (2000). *Contrastive Discourse in Chinese and English: A Critical Appraisal*. Beijing: Foreign Language Teaching and Research Press.
- Shi, Y., Tang, Y. R., & Long, W. (2019). Sentiment contagion analysis of interacting investors: evidence from china's stock forum. *Physica A: Statal Mechanics and its Applications*, 523, 246-259.
- Song, J., Song, T. M., Seo, D. C., Jin, D. L., & Kim, J. S. (2017). Social big data analysis of information spread and perceived infection risk during the 2015 middle-east respiratory syndrome outbreak in South Korea. *CyberpsycholBehavSocNetw*, 20(1), 22-29.
- Tang, B. (2017). *Systemic-Functional Approach to Discourse Features of Evidentiality in English News Reports of Epidemic Situation Update*. Xiamen: Xiamen University Press.
- van Dijk, T. A. (1990). *News as Discourse*. Hillsdale: Lawrence Erlbaum Associates, Inc. Publishers.
- Widyaningrum, P., Ruldeviyani, Y., & Dharayani, R. (2019). Sentiment analysis to assess the community's enthusiasm towards the development chatbot using an appraisal theory. *Procedia Computer Science*, 161, 723-730.
- Xu, G., Yu, Z., Yao, H., Li, F., Meng, Y., & Wu, X. (2019). Chinese text sentiment analysis based on extended sentiment dictionary. *IEEE Access*, 7, 43749-43762.
- Yang, L., Zhu, J., & Tang, S. (2013). Survey of text sentiment analysis. *Journal of Computer Applications*, 33(6), 1574-1578.
- Yang, W., Cheng, L., & Zhen, K. (2020). Cognitive analysis of the "discourse stances" in English news reports on smog in China and America. *International Journal of English Linguistics*, 10(4), 145-158.
- Yu, Y. (2021). Resisting foreign hostility in China's English-language news media during the COVID-19 crisis. *Asian Studies Review*. 47(2), 254-271. <https://doi.org/10.1080/10357823.2021.1947969>
- Yu, Y. (2022). Legitimising a global fight for a shared future: A critical metaphor analysis of the reportage of COVID-19 in China Daily. In A. Musolff, R. Breeze, K. Kondo, & S. Vilar-Lluch (Eds.), *Pandemic and Crisis Discourse. Communicating COVID-19* (pp. 241-254). London: Bloomsbury.
- Yuan, J. X., (2009). A critical discourse analysis of news discourse: A case study of snow storm reports in early 2008. *Journal of Hunan First Normal College*, 9(1), 123-143.
- Zhao, Y. Y., Qin, B., & Liu, T. (2010). Sentiment analysis. *Journal of Software*, 21(8), 1834-1848
- Zhou, L. Z., He, Y. K., & Wang, J. Y. (2008). Survey on research of sentiment analysis. *Journal of Computer Applications*, 28(11), 2725-2728.
- Zhou, Y. Han., (2012). Critical discourse analysis in news reports: News reports about KimJong-il's death from main stream news reports. *Journal of Kunming Metallurgy College*, 28(6), 82-86.