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Full Paper

Mining themes, emotions, and stance in the news coverage of the Russia–Ukraine War from Reuters and Xinhua

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Abstract

The Russia–Ukraine War has emerged as a highly contentious global issue since 2022. While China and the UK are not directly involved in the conflict, considerable attention has been drawn to their positions and perspectives on this event. In such context, conducting a comparative study on how the British and Chinese mainstream media cover the Russia–Ukraine conflict can provide valuable insights into the influence of ideological differences on news framing and shed light on the respective stances of these two news agencies. Employing an interdisciplinary methodology, this study integrates corpus tools, critical discourse analysis, text mining, and emotion computation to systematically analyze news reports covering the Russia–Ukraine War from Reuters and Xinhua between 2022 and 2023. Results show different patterns in the news reports from the two investigated news agencies, including the monthly publication of news articles, the occurrence of prominent entities, and the thematic emphasis. Additionally, significant variations are identified in specific dimensions of emotion and emotional intensity, indicating the divergent stances of the two news agencies on a range of significant issues.

Keywords: Russia–Ukraine War; news discourse; emotion computation; corpus linguistics; text mining.

1. Introduction

Over the past several decades, there has been a discernible intensification of emotion (Zappettini, Ponton, and Larina 2021) due to the 'affective turn' in journalism (Wahl-Jorgensen 2016). In contrast to earlier research that prioritized the objectivity of news reporting (Schudson 2001), recent studies have redirected their focus towards the role of emotion in journalism (Bednarek 2008; Pantti 2010; Bednarek and Caple 2012). The ubiquity of emotional elements in news media can be ascribed to a range of 'news values' that encompass the active pursuit of audience engagement and the practice of 'personalization' (Bednarek 2008).

The deployment of emotions in news media is not arbitrary, but rather shaped by socio-cultural factors (Van Dijk 1988a, 1988b). Scholars have noted the intricate entanglement of emotion and ideology, as emotions can serve as potent rhetorical tools to activate preexisting beliefs and stances, either reinforcing or challenging prevailing ideologies (Wetherell 2015). The strategic deployment and construction of emotions have become a recognized feature of news discourse (Zappettini, Ponton, and Larina 2021). News media, driven by diverse ideologies and stances, may adopt distinct discursive strategies in their use of emotional terms. However, existing studies that address emotion in news discourse basically revolve around theoretical establishment and qualitative discussion, which is hard to be operationalized in large-scale corpus from a computational perspective. Also, researcher subjectivity and bias are hard to avoid, and may leave great influence on the reliability of results.

The primary objective of this research is to examine several quantifiable aspects of news discourse as subjected to ideological and socio-cultural factors. Given that narratives of war frequently involve emotional language and ideological contestation (Mestre-Mestre 2023), the study centers its investigation on this particular topic. Specifically, the focus is on the Russia–Ukraine War, which experienced a significant escalation since February 2022 and has evolved into a large-scale warfare grabbing global attention. This international event has sparked intense discussions

across various disciplines. However, existing scholarly literature mainly concentrates on Russia and Ukraine as the central entities involved in the conflict, as well as the media discourses within these two countries. Hence, there is a need to broaden the investigative scope towards the perspectives and voices of other significant actors associated with the war, such as China and the UK.

The present study, thus, focuses on news coverage of the Russia–Ukraine War from Xinhua[1] and Reuters, two mainstream news agencies representing China and the UK, respectively. Three primary research questions (RQs) are proposed as follows:

> RQ1: What are the disparities in the number of monthly publication and occurrence of important entities between Xinhua and Reuters?
> RQ2: What are the distinctive thematic emphases of the two news agencies when covering the Russia–Ukraine War?
> RQ3: What are the distinct patterns in the use of emotional terms by the aforementioned news media?

A customized corpus comprising two sub-corpora is built to facilitate the study's investigation. To answer RQ1, statistics regarding the number of monthly publication and frequencies of important entities were provided, and two co-occurrence networks are constructed by computing the pointwise mutual information (PMI) values between word pairs across the two sub-corpora. To answer RQ2, the multilingual NRC Word-Emotion Association Lexicon (Mohammad and Turney 2010, 2013) and the NRC Emotion Intensity Lexicon (Mohammad 2018) were applied to identify the highest-frequency emotion words across eight emotion categories and to calculate the intensity associated with different emotions.

The structure of the article is as follows. Section 2 reviews the existing literature adressing emotion from a computational perspective and emotion analysis of the Russia–Ukraine War in media discourse. Section 3 describes the corpus and methods. Section 4 presents both quantitative and qualitative analysis regarding distinctive patterns of themes, emotions, and stance in Xinhua and Reuters. Section 5 concludes the study with the major findings, implications, limitations, and some future directions.

2. Literature review

2.1 Addressing emotion from a computational perspective

The concept of emotion is complex, dynamic, and multifaceted. For psychologists, emotion encompasses changing subjective experiences, biological responses, and mental states that arise in response to internal or external stimuli, which can be measured through observations or experiments. For linguistics, investigations have been situated within a diverse array of theoretical frameworks (Benamara, Taboada, and Mathieu 2017), including evaluation (Hunston and Thompson 2000; Hunston 2011), appraisal (Martin and White 2005), and stance (Biber and Finegan 1988). These theoretical frameworks mainly rely on detailed textual analysis and case studies to categorize and analyze attitudes, stance, and judgment within specific contexts.

For computational linguists, their aim is to extract as much fine-grained emotional information in large quantity of textual data as possible. Since words often carry emotions, either denotatively or connotatively (Mohammad 2023), it is rather intuitive to construct emotion lexicons, in which each word can be assigned one or more emotion categories. To take into account the degree or intensity of emotional manifestation, other dimensions such as valence, arousal, and dominance can also be represented by numeric scores. In recent years, quite a few emotion lexicons have been developed. Representative examples include NRC Emotion Lexicon (Mohammad and Turney 2010, 2013); Linguistic Inquiry and Word Count (LIWC) (Pennebaker, Francis, and Booth 2001), Sentiment Analysis and Social Cognition Engine (SÉANCE) (Crossley, Kyle, and McNamara 2017), WordNet Affect (Strapparava and Valitutti 2004), as well as SentiWordNet (SWN) (Baccianella, Esuli, and Sebastiani 2010). These emotion lexicons boast both interpretability and computability, enabling scholars to carry out emotional analysis on large-scale datasets without compromising too much nuances of contextual meanings.

Another line of research within the computational linguistic and NLP communities claims that lexicon-based method performs unsatisfactorily in classifying and identifying emotions, since words can have different meanings according to contexts, the one-size-fits-all emotion lexicons may fail to capture these variations. Therefore, in cases of irony, sarcasm, exaggeration, and understatement, emotion lexicons often do not suffice to classify texts into appropriate categories. To address this downside, machine learning or deep learning-methods (Ranganathan, Chakraborty, and Panchanathan 2016; Guo 2022) are used to extract word or sentence embeddings from a global view, usually achieving better accuracy in many emotion classification tasks. However, one inherent flaw is the difficulty to interpret the results due to the high dimension of features or weight matrices.

2.2 Emotion analysis of the Russia–Ukraine War on media platforms

Emotions have long been recognized as influential factors in conflict situations. By investigating emotions,

researchers can gain insights into the underlying ideology, attitudes, and social-cultural factors that combine to influence conflict dynamics. Emotions can also play a crucial role in shaping attitudes and expressing stance, and thus, they have a natural bond with media (Wahl-Jorgensen 2019a, 2019b), which exerts huge impact on reflecting and guiding public opinion.

The ongoing Russia–Ukraine War has been a complex and emotionally charged conflict (Ptaszek et al. 2024) that has drawn significant attention from researchers in many disciplines. Since the war broke out, various studies have been conducted to explore emotions and sentiment in media. One line of research takes advantage of the existing emotion lexicons to extract emotion words of each category and count their frequencies. This lexicon-based method can be combined with word co-occurrence networks, keywords extraction, and topic modeling (Guerra and Karakus 2023; Mestre-Mestre 2023).

Another line of research resorts to machine learning and featuring engineering (Al Maruf et al. 2023; Wadhwani et al. 2023). These studies calculate frequencies of textual features, which can be term frequency, term frequency–inverse document frequency (TF-TDF), or *n*-grams. Based on these features and emotion labels, the total textual dataset can be split into a training set and a test set to train and test the machine learning algorithms. There are also studies conducting emotion analysis through deep learning methods (Aslan 2023; Vyas, Vyas, and Dhiman 2023). Different from machine learning algorithms that rely on extracting features designated by human, deep learning methods assume that the trained word embeddings have already encompassed all the contextual information, including the emotional one. These studies show high accuracy on emotion classification, but is burdened with the difficulty to interpret the results.

3. Methodology

The study employed text mining, emotion computation, critical discourse analysis, and corpus tools to undertake a comprehensive examination of news reports surrounding the Russia–Ukraine conflict in two representative British and Chinese news media.

First, a corpus containing news reports from Reuters and Xinhua was established. To ensure data quality, several steps of text processing were taken, including automatic filtering and manual examination. The details are addressed in Section 3.1. This section also introduces how to extract the release date and important entities in the news reports.

Next, Section 3.2. addressed the process of constructing word co-occurrence networks, with an aim to identify major themes in the two news agencies, and to investigate their similarities and differences in focus, scope, and perspectives. After that, Section 3.3. introduced how lexicon-based emotion computation was conducted to reveal emotions and stances reflected in the news articles by looking into high-frequency emotion words and the distribution of emotional intensity. This allowed for a further comparison of how the two new agencies constructed emotions around the themes and how they implied stances via the use of emotional language. To complement the above data-driven text mining, this study also made fine-grained analysis of several textual instances, hoping to unearth the subtle attitudinal divergences manifest within the news stories.

3.1 Corpus building and extraction of descriptive statistics

Reports of the Russia–Ukraine War from Reuters were collected via Factiva.[2] The data collection process involved four major steps: (1) search on Factiva using three keywords: 'Ukraine war', 'Ukraine crisis', and 'Russia–Ukraine' within the time frame of 24 February 2022 to 24 February 2023, and only retain reports containing these keywords in their headlines or leads. The date 24 February 2022 was selected as the starting point because the war entered a full-scale breakout since this day; (2) download each news article as a single text file; (3) remove duplicates with the same title; (4) remove HTML tags, special characters, and non-alphanumeric symbols via regular expressions. The same procedure was applied to extract news articles from Xinhua, except for the first step, in which the keywords were replaced by their corresponding Chinese: '乌克兰', '乌克兰危机', and '俄乌'. After this process, 6,297 English news items and 2,562 Chinese news items were compiled into the corpus. Basic information of the corpus is listed in Table 1.

The decision to use Reuters and Xinhua as the exclusive sources of news reports was a tradeoff between comprehensiveness and manageability, since analyzing all major news agencies in Britain and China would entail significant resources, time, and text processing efforts. It would also pose challenges to manual examination and data quality. Both Reuters and Xinhua are reputable and well-established news organizations with extensive international coverage, longstanding presence in the media industry, and wide readership, which makes them suitable choices for this study's scope.

Table 1. Total number of news items.

Item	Xinhua	Reuters
Total number of reports	2,562	6,297
Total number of tokens	597,623	1,782,427

Based on the established corpus, the release dates of each news article can be automatically extracted via regular expressions, as they are typically located below the headline. This information is then used to calculate the numbers of monthly publication of the news agencies. Moreover, the Named Entity Recognition (NER) function in NLTK is employed to extract the mentioned countries and regions from the news reports.

3.2 Word co-occurrence network based on PMI

In the realm of text mining and natural language processing (NLP), pointwise mutual information (PMI) serves as a crucial metric in identifying topics or themes within textual corpora. PMI represents statistical interdependence between a pair of words. It captures the extent to which the occurrence of one word influences the likelihood of another occurring within a given context, offering a method to discern meaningful lexical associations.

This study constructs a word co-occurrence network based on the computation of PMI values between word pairs across a text corpus. Since higher PMI values usually indicate stronger co-occurrence relationships, the author used 200 words with the highest PMI values to form edges connecting words that exhibit notable contextual relationships. Through this process, an interconnected network structure emerges, reflecting the web of lexical associations within the corpus. Moreover, PMI also plays an important role in topic identification, because semantically and contextually close words will group into clusters, which can be indicative of potential themes. The formula to compute PMI is given below, where p (word1, word2) represents the frequency that two terms co-occur, p(word1) represents the frequency of term 1, and p (word2) represents the frequency of term 2.

$$\mathrm{PMI}_{\mathrm{word1word2}} = \log_2 \frac{p\ (\mathrm{word1}, \mathrm{word2})}{p(\mathrm{word1})\ p(\mathrm{word2})}$$

3.3 Emotion computation based on emotion lexicon

The current study used the NRC Word-Emotion Association Lexicon[3] (Mohammad and Turney 2010, 2013) and the NRC Affect Intensity Lexicon[4] (Mohammad 2018) for the purpose of emotion computation. Developed by the National Research Council of Canada, these lexicons are assigned emotional associations and intensity levels by means of crowdsourcing.

In NRC Word-Emotion Association Lexicon, each word is annotated with a binary score to indicate its presence (1) or absence (0) in one or more emotional categories in the eight fundamental emotions, including joy, sadness, anger, fear, surprise, anticipation, trust, and disgust. In contrast, the NRC Affect Intensity Lexicon assigns continuous intensity scores to words. Each word is associated with a value between 0 and 1, signifying the magnitude of its emotional intensity. Words with scores closer to 1 are deemed to exhibit high emotional intensity, while those closer to 0 indicate a low emotional impact. This lexicon empowers emotion computation to go beyond mere emotion detection by measuring the relative strength of emotions within textual content. The two emotion lexicons support over 100 languages, including English and Chinese. They were downloaded as txt files for further inquiry.

Both the two lexicons are based on the Plutchik framework (Plutchik 1994). Rooted in psychological and evolutionary theories, this framework holds that the eight emotions represent the foundation of all the other complex emotional states, and asserts the universality and primordial nature of these emotions across cultures and societies. In this study, which involves a comparative analysis between two cultures, the adoption of the Plutchik framework suffices to provide a comprehensive and robust foundation for examining and understanding emotions in different cultural contexts.

The process of emotion computation involved the following steps. First, English and Chinese news articles were tokenized using NLTK[5] and jieba,[6] respectively, two widely used Python packages in the NLP community. Next, a Python script was used to search for the tokenized words within the emotion lexicon files, determining their association with one or more emotion categories. Frequencies of the identified emotion words were calculated and sorted in the reverse order to yield a list of high-frequency emotion words. Then, recognizing the complexity and context-dependent nature of emotions, sentence-level sentiment analysis was performed separately on the English and Chinese news using Textblob[7] and SnowNLP.[8] This step was taken to account for the possibility that the real emotions conveyed by the identified words might deviate from the assigned designations in the emotion lexicon. With this process, emotion words belonging to positive categories (anticipation, joy, surprise, trust) but occurring in sentences expressing negative sentiment, as well as vice versa, were discarded. Finally, to determine the intensity of retained emotion words, the frequency of each word was multiplied by its corresponding intensity score from the NRC Emotion Intensity Lexicon. These numerical values were added together, and then, divided by the total frequency of emotion words within the corresponding emotion category. As a result, emotion intensity values ranging from 0 to 1 were obtained, representing the relative strength of each emotion.

In summary, the computation of emotions encompassed various stages, including tokenization, lexicon-based word matching, frequency calculation, emotion word filtering through sentence-level sentiment analysis, and intensity scoring. This rigorous approach allowed for a robust assessment of emotional expressions within the English and Chinese news sub-corpora.

4. Results of quantitative analysis

4.1 Trends in the number of news reports

Generally, it can be observed from Fig. 1 that the number of news items from Reuters consistently surpass that of Xinhua during the time span in this study. Besides, both Reuters and Xinhua have devoted close and sustained attention in the first two months after the war broke out, but gradually reduced their news coverage in the following months, and a reverse trend is seen starting from the end of 2022.

4.2 Important entities in Xinhua and Reuters

As presented in Table 2, In Xinhua's reports, 'Ukraine' appears most frequently, occupying nearly twice the frequency of 'Russia'. This underscores the pronounced attention of Xinhua towards the situation in Ukraine. Additionally, Xinhua's frequent mention of 'China' and 'Beijing' reflects its great emphasis on delivering and demonstrating China's stance and attitude in the news items.

As for Reuters, entities representing Russia and the USA appear at the top of the frequency list, with Ukraine following them and ranking the third. This indicates that in comparison to Ukraine, Reuters seems to devote more attention to situations in Russia and the USA. Additionally, although China has never been directly involved in the Russia–Ukraine war, and is far from the geographical center of the conflict zone in Europe, it nevertheless emerges as the fourth most frequently mentioned entity in Reuters' news, suggesting the news media's great concern for China's stance and actions. Moreover, Reuters recurrently draws parallels between Russian military actions and terrorism in Syria, suggesting the potential use of chemical weapons by Russia (e.g. 'likened the situation in Ukraine to Syria, where he said chemical attacks by 'terrorist groups' were blamed on the Syrian authorities', Reuters, 22 March 2022). Notably, Reuters also frequently mentions Taiwan, often linking the Ukraine crisis with the Taiwan issue. Xinhua, in response, repeatedly affirms China's position on the Taiwan issue and the 'One-China principle', which is the reason why 'Taiwan' emerges as a prominent high-frequency term in both Xinhua and Reuters reports.

4.3 Themes in the two news agencies

Fig. 2 presents the co-occurrence network of Reuters' news reports on the Russia–Ukraine war, and Table 3 lists the top 5 most important keywords within each cluster. It is noticeable that the cluster denoted by the color purple comprises the largest number of nodes,

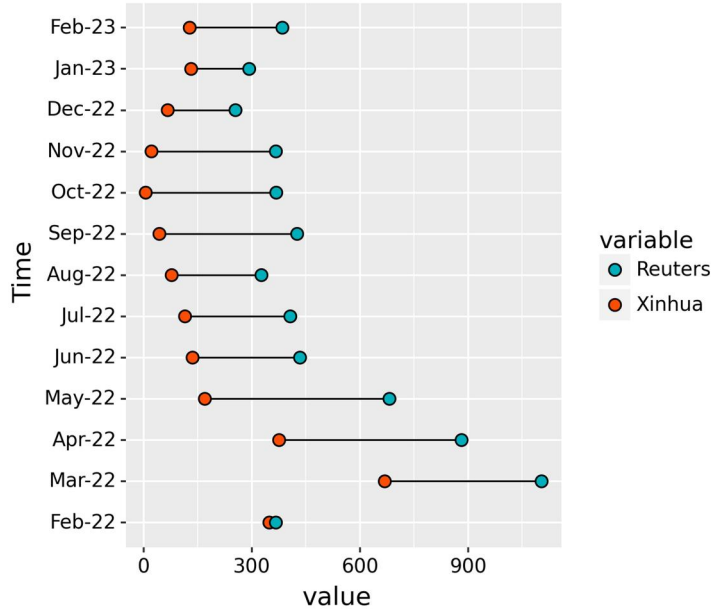

Figure 1. Monthly publication of news reports from Reuters and Xinhua.

Table 2. High-frequency entities in Xinhua and Reuters.

Xinhua	Frequency (%)	Reuters	Frequency (%)
乌克兰/乌方[Ukraine]	11,987 (29.42%)	Russia/Moscow	14,280 (22.32%)
俄罗斯/俄方[Russia]	5,922 (14.53%)	The USA/US/Washington/America	15,012 (23.47%)
美国/美/美方[the US]	5,086 (12.48%)	Ukraine	11,834 (18.50%)
中国/中方[China]	3,052 (7.49%)	China/Beijing/Taiwan	2,383 (3.73%)
德国[Germany]	660 (1.62%)	Kyiv	765 (1.20%)
波兰[Poland]	584 (1.43)	Mariupol	736 (1.15%)
土耳其[Turkey]	548 (1.34%)	Britain/London	714 (1.11%)
英国[the UK]	449 (1.10%)	Donbas	717 (1.11%)
法国[France]	382 (0.94%)	Poland	655 (1.02%)
台湾[Taiwan]	318 (0.78%)	Syria	488 (0.76%)

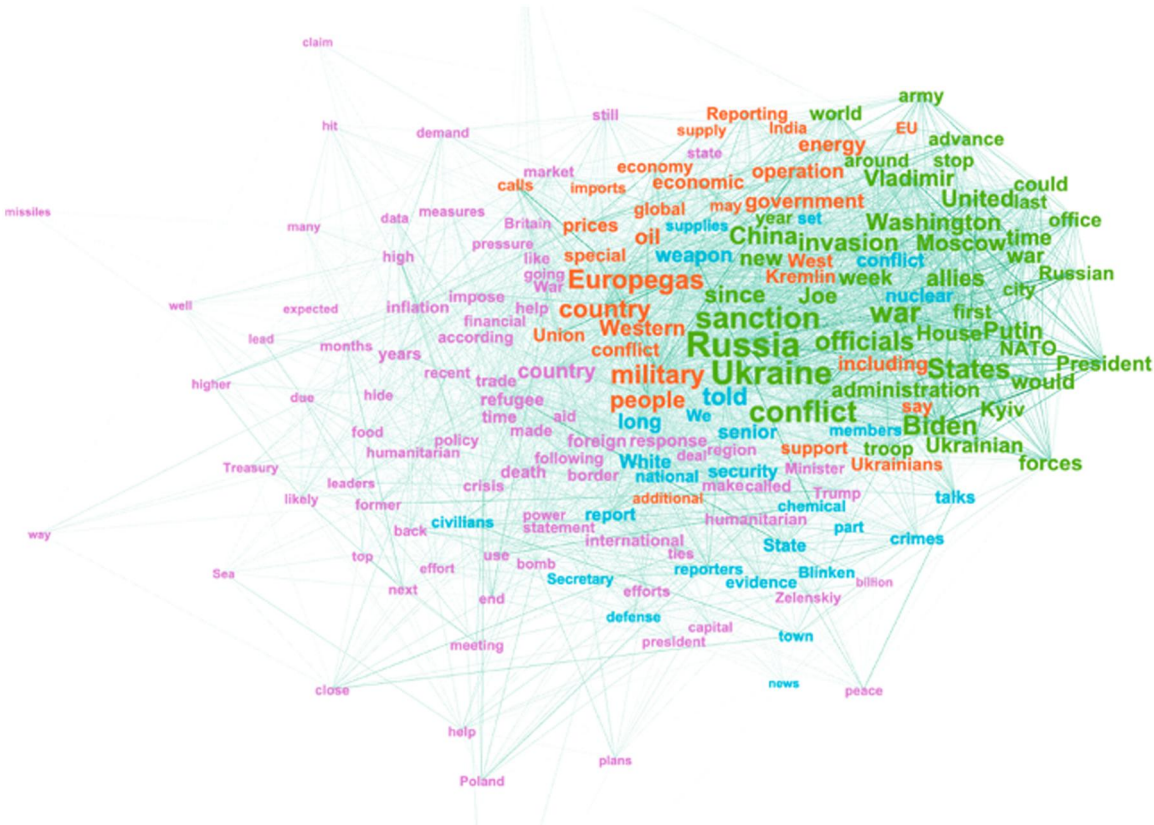

Figure 2. Word co-occurrence network of news reports in Reuters.

Table 3. Keywords of each semantic cluster in Reuters.

Cluster	Topic	Keywords	Proportion, %
	Refugee issues	Refugee, meeting, policy, international, help	31.3
	Economic and energy security	European, West, military, economy, energy	25.2
	Major players involved	Russia, Ukraine, Putin, conflict, Moscow	25.1
	Military operations	Weapon, crime, chemical, defense, civilian	18.4

encompassing nearly one-third of the entire words in the network. Keywords such as ‘refugee’, ‘death’, and ‘policy’ suggest that refugee crisis is a significant thematic focus for this cluster. The orange one revolves around the repercussions of the Russia–Ukraine war on global economics, trade, and supply chains (as indicated by ‘economy’, ‘import’, and ‘supply’), as well as the substantial challenges posed to energy supply and the stability of global oil price (as suggested by ‘energy’, ‘oil’, ‘price’). The green cluster mainly consists of relevant national and regional entities involved in the Russia–Ukraine conflict (e.g. ‘Russia’, ‘Ukraine’, ‘Moscow’, and ‘Kyiv’), as well as influential figures such as Vladimir Putin and Joe Biden. It is also noteworthy that other significant countries and organizations, including the NATO and the USA, also appear in this cluster (e.g. ‘White House’, ‘Washington’, and ‘China’). The blue cluster constitutes the smallest proportion characterized by less clear boundaries, with its nodes interspersed in other clusters. The overarching theme within this cluster can be summarized as a range of military operations and the usage of weapons during the war (as indicated by ‘operation’, ‘weapon’, ‘chemical’, ‘nuclear’, and ‘defense’).

Xinhua’s news articles form five distinct clusters (see Fig. 3 and Table 4). The purple one occupies the largest proportion. Notably, keywords such ‘乌方’ [Ukrainian], ‘俄方’ [Russian side], ‘武器’ [weapons], ‘军事行动’ [military operations], and ‘武装部队’ [armed forces] within this cluster indicate its thematic focus on a series of military activities and operations between the two sides. The green cluster revolves around the reactions from the international community and the mediation efforts in response to the war, as suggested by terms like ‘谈判’ [negotiation], ‘对话’ [dialogue], ‘会议’ [meetings], and ‘代表’ [representatives]. As for the blue cluster, it mainly centers on the contradictions between peace and conflict. The severity of the crisis has brought significant harm to countries on the borders and member states within NATO with ‘和平’ [peace] emerging as the most important term in this cluster. The orange cluster’s theme encompasses the global and regional economic repercussions and supply chain disruptions resulting from the Russia–Ukraine conflict. It also addresses international measures aimed at curbing Russia through sanctions (as indicated by ‘措施’ [measures] and ‘制裁’ [sanctions]. The green cluster takes up the smallest proportion However, the pivotal terms ‘人道主义’ [humanitarian] and ‘安全’ [security] are highly distinctive. This cluster is mainly about China’s contributions to humanitarian endeavors on the international stage, including ensuring the personal safety of stranded individuals in Ukraine, facilitating the evacuation of Chinese citizens, and providing assistance to refugees.

4.4 Patterns of emotion words and intensity

Tables 5 and 6 present the high-frequency words of each emotion category in news reports from Reuters and Xinhua, respectively. It is evident that words

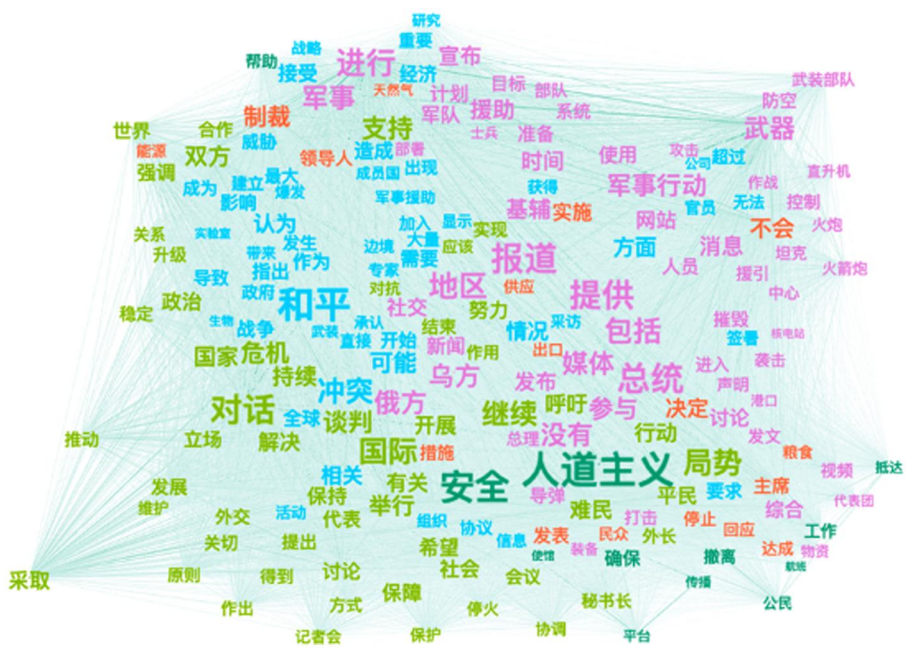

Figure 3. Word co-occurrence network of news reports in Xinhua.

Table 4. Keywords of each semantic cluster in Reuters.

Cluster	Theme	Keywords	Percentage, %
	军事行动 (Military operations)	报道, 乌方, 俄方, 武器, 军事 [reports, Ukraine, Russia, weapons, military]	29.1
	对话协商 (Dialogues and negotiations)	对话, 局势, 国际, 谈判, 解决 [dialogue, situation, international, negotiation, solution]	20.8
	和平与冲突 (Peace and conflict)	和平, 冲突, 协议, 需要, 可能 [peace, conflict, agreement, need, may]	17.3
	经济与能源问题 (Economic and energy issues)	制裁, 决定, 措施, 能源, 出口 [sanction, decision, measure, energy, export]	7.8
	人道主义和难民问题 (Humanitarianism and refugee issues)	人道主义, 安全, 确保, 帮助, 撤离 [humanitarianism, safety, guarantee, help, evacuate]	6.6

Table 5. High-frequency emotion words in Reuters.

Emotions	Frequency (per 1,000 words)	Five most high-frequency emotion words
Anticipation	2,521 (4.35)	hope, time, expect, plan, coming
Joy	3 (0.01)	helpful, comfort, bless
Surprise	6,803 (3.86)	trip, unprecedented, incident, assessment, surge
Trust	1,606 (0.91)	official, negotiate, policy, budget, committee
Anger	7,142 (4.06)	court, displaced, tighten, rocket, battalion
Fear	11,867 (6.74)	military, operation, missile, fire, change
Sadness	1,705 (0.97)	death, refugee, injure, damage, kill
Disgust	1,224 (0.70)	abuse, blame, accuse, blood, debris
Total	32,907	

Table 6. High-frequency emotion words in Xinhua.

Emotions	Frequency (per 1,000 words)	Five most high-frequency emotion words
Anticipation	932 (1.60)	希望, 计划, 开始, 行动, 试图 [hope, plan, start, action, attempt]
Joy	0 (0.00)	/
Surprise	1,461 (2.52)	事件, 突然, 评估, 调整, 直接 [event, suddenly, evaluate, adjust, directly]
Trust	216 (0.37)	国家, 系统, 根据, 发言人, 不可分割 [nation, system, according to, spokesman, inalienable]
Anger	1,142 (1.97)	武器, 火箭, 政治, 流离失所, 反应 [weapon, rocket, politics, homeless, response]
Fear	2,188 (3.77)	导弹, 军队, 失控, 强大, 轰炸机 [missile, army, out of control, powerful, bomber]
Sadness	827 (1.42)	难民, 伤亡, 灾害, 死亡, 痛苦 [refugee, injury, damage, death, pain]
Disgust	116 (0.20)	痛恨, 满嘴, 谴责, 指控, 欺骗 [hate, irresponsible, blame, accuse, lie]
Total	6,882	

conveying fear occur most frequently in both corpora. Following fear, emotion words in the category of anger and surprise also show high frequencies. Conversely, occurrences of words associated with trust and disgust are below 1 per thousand words, while words related to joy seldom appear in both corpora. However, a notable distinction is that Xinhua employs significantly more Anticipation and Sadness-associated emotion words when reporting on the Russia–Ukraine war than Reuters. (χ^2=121.975, df=1, P<.001; χ^2=198.152, df=1, P<.001).

Intensity of each emotion category is also computed with the assistance of NRC Affect Intensity, and the results are exhibited in Figs 4 and 5. In general, fear

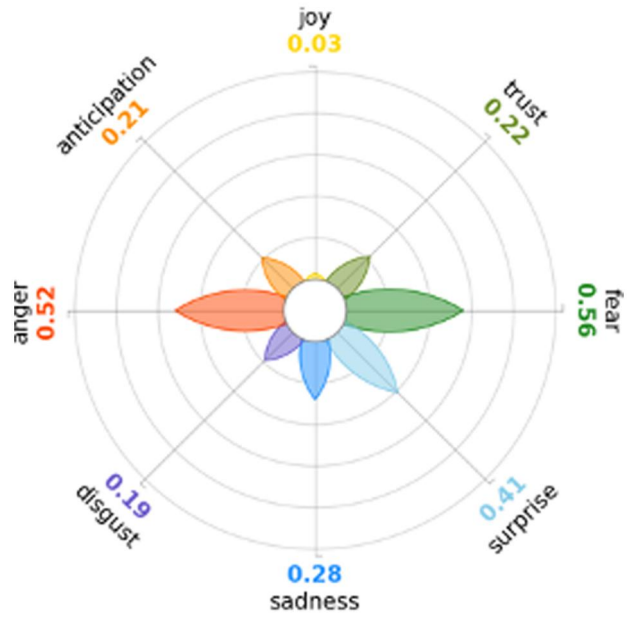

Figure 4. Emotional intensity in Reuters.

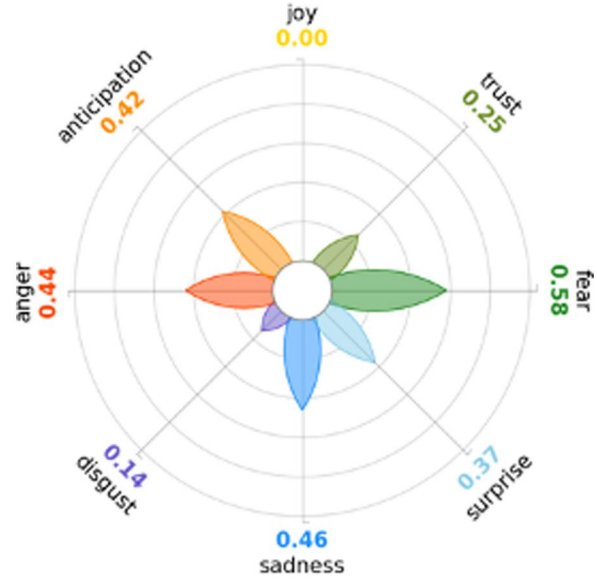

Figure 5. Emotional intensity in Xinhua.

and anger represent the two emotions with the highest intensity in both Reuters and Xinhua. However, in the case of Xinhua, while emotion words in the category of sadness do not show a prominent frequency, their emotional intensity reaches as high as 0.46, presenting a marked disparity compared to Reuters. A similar trend is observed for the category of anticipation as well.

5. Qualitative analysis

To facilitate a more thorough investigation into the use of emotion terms in the two media sources, detailed qualitative analyses were conducted. Within each of the eight emotion categories, textual instances were sorted based on their emotional intensity as calculated by multiplying the frequency of emotion words and their corresponding intensity scores. The top

20 instances with the highest intensity scores were selected for manual examination. However, due to the space limitation, only the most representative example was analyzed for those emotion categories that failed to exhibit significant differences in the chi-square testing (see Subsection 4.4). Conversely, for the two categories that demonstrated significant differences (Anticipation and Sadness), multiple examples were presented to illustrate the observed distinctions. It is important to note that texts incorporating emotion words associated with Trust and Joy did not yield substantial insights. Thus, these two emotion categories were not subjected to detailed analysis.

5.1 Fear

In many cases, emotion words expressing fear often occur in the context of military operations and the use of weaponry. Example 1, which is extracted from Reuters, depicts an instance when Russia, despite its commitment to downplaying its military operations, unexpectedly initiated air attacks on Kyiv. This unanticipated turn of events triggered a wave of fear within the international community. Similarly, Example 2 is extracted from Xinhua, which is s a segment from an interview with a researcher from the Institute of Eastern European and Central Asian Studies in China Academy of Social Sciences. The interviewee overtly expressed his concerns that the escalating Russia–Ukraine conflict might spiral out of control, making a local crisis into a global-scale war.

Example 1. Russian forces bombarded the outskirts of the capital Kyiv and the besieged city of Chernihiv in northern Ukraine on Wednesday, a day after Russia promised to scale down military operations. (Reuters 30 March 2022)

Example 2. 近各国媒体和专家都在担心俄乌冲突失控的可能性, 俄外长拉夫罗夫警告称, 考虑北约正间接地与俄罗斯打一场战争, 世界当前面临爆发第三次世界大战的真实威胁。(新华网 28 April 2022)
Gloss: Recently, the media and experts in various countries are worried about the possibility of the conflict between Russia and Ukraine spinning out of control. Russian Foreign Minister Sergei Lavrov warned that the world is now facing a real threat of a third world war, considering that NATO is indirectly fighting a war with Russia. (Xinhua 28 April 2022)

5.2 Anger

As illustrated in Examples 3 and 4, emotion words related to anger appeared frequently in both Reuters and Xinhua, often in the context of disastrous consequences brought by the war, including the loss of life, property damage, and acts against the humanitarian spirit.

Example 3. Russia's February 24 invasion of Ukraine has killed thousands of people, displaced millions, and raised fears of a wider confrontation between Russia and the USA. (Reuters 24 February 2022)

Example 4. 他说, 乌克兰人道主义局势严峻, 大批流离失所者和被困战区人员急需食物、饮用水、医卫用品等基本生活物资, 红十字国际委员会和整个国际红十字运动正在积极筹措。(新华网 1 April 2022)
Gloss: He said that the humanitarian situation in Ukraine is grave, with a large number of people being displaced or trapped in the war zone in urgent need of food, drinking water, medical supplies and other basic necessities, and the ICRC and all people in the international Red Cross are actively mobilizing for help. (Xinhua 1 April 2022)

5.3 Surprise

Since the end of World War II, there has been no large-scale war in the world, with peace and development becoming the major theme in the current world. Under such context, the escalating conflict between Russia and Ukraine that eventually evolved into a protracted war was extremely surprising. Thus, emotion words in the category of surprise frequently appeared in the two media to describe the unpredictable situations of the Russia–Ukraine war and the complexity of the intricate dynamics of the international landscape, as reflected by Examples 5 and 6.

Example 5. This is again unprecedented and this will not facilitate or encourage or be helpful to what is happening between Russia and the Ukrainian peace talks, Nebenzia said at a press conference. (Reuters 5 April 2022)

Example 6. 英国国家经济社会研究院首席经济学家毛旭新在接受新华社记者采访时表示, 俄乌局势突然升级令市场措手不及, 局势紧张程度超出预期, 这种不确定性带来的风险导致油气价格上升。(新华网 25 February 2022)
Gloss: Mao Xuxin, Chief Economist of the U. K. National Institute of Economic and Social Research, conveyed in an interview with Xinhua News Agency that the sudden escalation of the Russia–Ukraine conflict

caught the markets off guard. The heightened intensity of the situation surpassed expectations, and the resulting uncertainty has given rise to risks that have led to an increase in oil and gas prices. (Xinhua 25 February 2022)

5.4 Disgust

The occurrence of emotion words related to disgust is relatively low in both news corpora. These terms are predominantly employed within the context of condemning acts of warfare and the instigators of the war. In Example 7, Reuters directly expresses its accusation against Russia's military operation on Ukraine, and even condemns its actions as a 'genocide'. By looking into Example 8, which is extracted from Xinhua, it can be seen that the accusation against Russia is not directly expressed by the Chinese government, but quoted from foreign spokespersons. This to some degree reflects Xinhua's negative attitudes on the Russia–Ukraine war, but is not as strong as Reuters.

Example 7. Ukrainian President Volodymyr Zelenskiy accused Russia of carrying out a genocide. (Reuters 27 May 2022)

Example 8. 乌克兰常驻联合国代表谢尔吉·基斯利茨亚在投票结束后的发言中对克里姆林宫的行为表示谴责。(新华网 26 February 2022)
Gloss: Ukraine's Permanent representative to the United Nations, Sergi Kislytsia, condemned the Kremlin's actions in a statement after the vote. (Xinhua 26 February 2022)

5.5 Anticipation

Since 'hope' appears most frequently in contexts related to Anticipation in both Reuters and Xinhua, this section is aimed to examine the different stances of the two news agencies through careful scrutiny of textual examples containing 'hope'.

In Table 7, it can be noted that in Xinhua, the subject of the verb '希望' [hope] is often governments or organizations, such as 'the Chinese government', 'the West', 'the USA', 'the UK', and 'some countries within NATO', instead of individuals. Thus, we can see that Xinhua frequently presents its stance through quoting third-party authoritative figures (e.g. Turkish Foreign Minister Çavuşoğlu, European researchers), strategically using their viewpoints to signify its own stance while implying evaluations of certain Western countries.

From textual instances containing the emotion word 'hope', we can see Xinhua's expectation that the suffering imposed on Ukraine and Ukrainians can be reduced with the assistance from the Chinse government, and its call for international support to help address the conflict through peaceful means. These news items are in line with the official stance of the Chinese government, which consistently advocates for peaceful conflict resolution through negotiation and consultation, aiming to restore peace between Russia and Ukraine. However, in its narratives, certain NATO countries express a desire for the 'crisis to continue' (Xinhua 29 April 2022), and seek to use sanctions as a means to 'obtain concessions on core interests from the other side' (Xinhua 8 March 2022). Thus, we can see that in Xinhua's news narratives, China is markedly distinguished from 'the West', creating a 'self-other' narrative (Van Dijk 1993, 2006) in framing the Russia–Ukraine war. Its discourse is not simply a delivery of information, but rather a powerful tool for shaping perceptions, opinions, and attitudes about China's stance on the war, and for building China's national image as a responsible country in pursuit of peace. Furthermore, Xinhua highlights the benevolent aid from the Chinese government to the Ukrainian people, and underscores the healthy and stable bilateral relationship between China and Ukraine since their establishment of diplomatic ties. These serve to show China's goodwill and its constructive role in international affairs.

Quite differently, in Reuters's news reports, the corresponding subject of 'hope' is typically individuals, often expressing personal emotions rather than national discourse. The representative examples extracted from Reuters are listed in Table 8. Collectively, they convey a sense of cautious optimism and a call for collaborative efforts amidst the ongoing crisis. Remarks from the Ukrainian President Zelensky reflect a consistent undertone of 'hope', emphasizing the desire for positive outcomes and measures. His reference to 'solutions for the situation in Mariupol' and the urgency for 'the whole world' to respond to a 'humanitarian catastrophe' underscores the gravity of the situation and an expectation for global support. Additionally, the call for 'direct interaction' with the Ministry of Defense and to 'work together to find alternative sources' illustrate a proactive stance towards addressing challenges imposed on Ukraine. People's hope for negotiations, despite their limited progress, conveys willingness to engage in diplomatic efforts. Thus, we can see that the frequent use of 'hope' is aimed to foster international collaboration, communicate urgency, and encourage positive developments amidst a complex and evolving geopolitical crisis.

5.6 Sadness

A glimpse into the high-frequency terms associated with sadness (see Tables 5 and 6) reveals that '难

Table 7. Instances containing 'hope' in Xinhua.

Index	Textual example
1	中乌建交30年来, 双边关系始终保持健康稳定发展势头。中方真诚希望俄乌双方能早日化干戈为玉帛。[Since the establishment of diplomatic ties between China and Ukraine 30 years ago, the bilateral relations have maintained a sound and steady momentum. China sincerely hopes that Russia and Ukraine can turn their conflicts into ploughshares at an early date.] (Xinhua, 29 April 2022)
2	拉夫罗夫说, 乌方谈判代表受美英领导, 西方希望拖延俄乌谈判, 以对俄造成损失并拖垮俄方。[Lavrov said that the Ukrainian negotiators are led by the USA and Britain, and the West wants to delay the Russian–Ukrainian negotiations to cause losses to Russia and drag down the Russian side.](Xinhua, 17 May 2022)
3	报道还引用其他专家指出, 约翰逊所说的'糟糕'的和平协议指的是该协议不适合伦敦, 而不是基辅。因为美国和英国希望冲突继续下去, 而欧洲国家已经沦为美国和英国路线的'人质'。[Other experts pointed out that Johnson's reference to a 'bad' peace deal meant that it did not suit London, rather than Kiev. Because the USA and the UK want the conflict to continue, and European countries have become 'hostages' of the American and British side.] (Xinhua, 9 July 2022)
4	面对顿巴斯地区重要的政治和战略意义, 乌克兰方面希望西方为其提供更多的武器援助, 尤其是重型火炮, 以应对俄罗斯在顿巴斯地区的激烈进攻而减少乌克兰军队的伤亡。[Considering the political and strategic importance of the Donbass region, Ukraine wants the West to provide it with more weapons, especially heavy artillery, in response to Russia's fierce offense in the Donbass region and reduce the casualties of Ukrainian troops.] (Xinhua, 14 June 2022)
5	土耳其外长恰武什奥卢在接受美国有线电视新闻网 (CNN) 采访时表示, 北约内部有些国家希望乌克兰危机继续下去。[In an interview with CNN, Turkish Foreign Minister Mevlut Cavusoglu said some countries within NATO want the Ukraine crisis to continue.] (Xinhua, 29 April 2022)

Table 8. Instances containing 'Hope' in Reuters.

Index	Textual example
1	'I hope there may still be solutions for the situation in Mariupol', Zelenskiy said. 'The whole world has to react to this humanitarian catastrophe'. (Reuters 2 April 2022)
2	But we hope that we will have a direct line for more direct interaction on issues related to Ukraine, especially with the leadership of the Ministry of Defense. (Reuters 24 March 2022)
3	But in an early morning address, Zelenskiy held out hope for negotiations, which have yielded little since the Feb. 24 invasion began. (Reuters 23 March 2022)
4	But what we do want to do is work together to find alternative sources over time. And that's what we hope to do with India, whether it's with regard to the security relationship, the energy relationship, etc. (Reuters 22 March 2022)

民'[refugees] holds prominent positions in both the two media agencies, indicating a shared focus on the refugee issues. Following the outbreak of the crisis, a significant number of Ukrainians fled to neighboring European countries, creating a continuous stream of refugees. According to data from the UN Refugee Agency,[9] from February to early November in 2022, nearly eight million refugees have left their homes, creating the largest refugee wave in Europe since the end of World War II. In the reports from Xinhua, we can find detailed depictions of the Ukrainian refugees' difficult situations (see Table 9). They struggle to adapt to local cultures in foreign countries, suffering from 'cultural conflicts'. Vulnerable groups such as women and children face various forms of exploitation and criminal offence, including labor exploitation, human trafficking, and physical abuse. Amidst a complex landscape of inflation, economic downturn, political disputes, and geopolitical conflicts, European countries also struggle to provide orderly reception and assistance to a large number of Ukrainian refugees, unable to safeguard their safety and rights. Through meticulous descriptions of these acute societal issues, Xinhua demonstrates its concern for these Ukrainian refugees and expresses sympathy for their distressing experiences.

When conducting searches using the keyword 'refugee' within Reuters' reports, we can sense the mixed stance and attitudes of the Western nations towards Ukrainian refugees. Upon examining the concordance lines presented in Fig. 6, it is evident that the term 'crisis' is frequently associated with 'refugee', suggesting a sentiment of exclusion and negativity among some groups in the West concerning refugees. The substantial influx of Ukrainians into European countries has resulted in the occupation of local resources, subsequently leading to an escalation in the cost of living for indigenous residents. This phenomenon has intensified the scarcity of limited societal resources, thereby heightening the competition for fundamental necessities such as education, healthcare, employment, and housing. Consequently, this intensified competition

Table 9. Instances containing 'refugee' in Xinhua.

Index	Textual examples
1	数百万乌克兰难民中, 以妇女和儿童居多, 这意味着前所未有的风险。[Among the millions of Ukrainian refugees, most are women and children, which represent unprecedented risks.]
2	许多观察人士担心, 这些逃离了战争的难民俄乌冲突爆发后不久,面临被贩卖和被迫遭受性剥削、卖淫或劳动剥削的可能。[Many observers fear that refugees who fled the war in the immediate aftermath of the conflict face the possibility of being trafficked and forced into sexual exploitation, prostitution or labor exploitation.]
3	布鲁塞尔某区负责人抱怨道, 最早的几批难民基本服从安排, 后来的人则越来越不愿融入接待家庭。[A district head in Brussels complained that the earliest batches of refugees mostly complied with the arrangements, while later arrivals became increasingly unwilling to integrate with host families.]
4	俄乌冲突爆发后, 一些欧洲国家'主动'接待乌克兰难民但因时间仓促, 准备不充分, 也没有相应的法律约束, 人道主义救助处于无序状态。[After the outbreak of the Russia–Ukraine conflict, some European countries 'proactively' received Ukrainian refugees, but due to the rushed timeframe and inadequate preparations, along with the absence of corresponding legal constraints, humanitarian assistance has been in a disorderly state.]
5	其次, 此次乌克兰难民数量众多, 加之经历两年多的新冠肺炎疫情冲击, 欧洲国家经济复苏乏力, 就业困难。[Furthermore, the substantial number of Ukrainian refugees, coupled with over two years of the COVID-19 pandemic's impact, has weakened the economic recovery of European countries and exacerbated employment challenges.]

Figure 6. Concordance lines containing 'refugee' in Reuters.

has gradually sparked a growing sense of dissatisfaction among the general populace. The co-occurrence of 'refugee' and 'crisis' underscores the perception that the influx of refugees has contributed to a challenging situation in which local populations and refugees alike vie for essential resources, provoking concerns and tensions within Western societies.

6. Discussion

One of the major interests of this study is to investigate the disparities in the number of monthly publication and occurrence of important entities between Xinhua and Reuters. To answer question, the release dates and entities appearing in the news reports were extracted through automatic means. Results show that during the studied time span reveals Reuters consistently published a higher number of news items compared to Xinhua. Both news agencies exhibited significant and continuous attention to the Russia–Ukraine War in the first two months following its outbreak, but gradually reduced the number of relevant news reports in the subsequent months, only increasing their coverage from the end of 2022.

The higher number of news items from Reuters indicates a potentially greater emphasis or resource allocation by the agencies towards covering the Russia–Ukraine War compared to Xinhua. This could be due to various factors such as editorial priorities, audience demand, or access to information sources (Boukes, Jones, and Vliegenthart 2022). The sustained attention from both agencies during the initial phase of the conflict suggests its perceived significance and newsworthiness. The subsequent decrease in news coverage by both agencies may indicate a shift in focus to other news events or a reduced novelty effect (Engelmann, Luebke, and Kessler 2021). However, the observed reversal and increased coverage towards the end of 2022 could reflect evolving developments in the conflict or renewed international attention. These findings highlight the dynamic nature of news coverage and the influence of various factors on the quantity and timing of reporting.

The word co-occurrence networks revealed that common topics of interest shared by both Reuters and

Xinhua included military activities, the economic consequences caused by the conflict, and issues related to energy security. However, differences also existed, and it could be seen that dialogue and negotiation, peace and conflict, and humanitarianism were themes noticeably manifest in Xinhua's news reports.

The shared thematic focus of Reuters and Xinhua establishes their credibility as reliable sources in reporting on the global topic under consideration. However, the divergent themes they emphasize indicate variations in their editorial priorities and potential reporting bias (Adegbola, Gearhart, and Cho 2022), which can shape the narrative and influence public comprehension of the discussed issues. Xinhua, as a state-owned news agency in China, operates within a distinct cultural and national framework that impacts its image construction and dissemination of values. This context aligns Xinhua's reporting with the values and priorities of the Chinese government and society. Consequently, Xinhua's emphasis on peaceful conflict resolution and humanitarian concerns reflects China's official position, contributing to its portrayal as a news agency that represents and advocates for China's interests and values.

As for the use of emotion words, both the two news agencies have conveyed fear as the war keep escalating, anger evoked by non-humanitarian actions and their calamitous repercussions, as well as surprise due to the capricious development of the war. Nevertheless, noticeable differences are observed in the category of Anticipation and Sadness. By examining textual examples containing the highest frequency word 'hope' in the category of Anticipation, it is observed that 'hope' in Xinhua is often associated with governments or organizations rather than individuals. The focus is on the Chinese government's stance and its call for international support in resolving the conflict peacefully. Xinhua also strategically quotes authoritative figures to signify its own stance while implying evaluations of certain Western countries. On the other hand, in Reuters' reports, 'hope' is typically expressed by individuals, reflecting personal emotions and emphasizing cautious optimism as well as collaborative efforts to address the crisis. In its portrayal of refugees, Xinhua demonstrates deep sympathy for the difficult situations faced by Ukrainian refugees, emphasizing their struggles to adapt to foreign cultures and the various forms of exploitation and abuse they experience. In contrast, there is a mixed stance and attitudes of Western nations towards Ukrainian refugees as reported by Reuters. The term 'crisis' is frequently associated with 'refugee', suggesting as least some sentiment of exclusion and negativity among some groups in the West.

Through the strategic use of these emotion words, Xinhua shapes the image of China as a responsible country advocating for peace and showing deep concern for humanitarian issues, especially related to the Ukrainian refugees. Such news framing allows Xinhua to present the Russia–Ukraine war within a specific ideological context while positioning China as a compassionate and proactive participant. In contrast, Reuters' news framing combines elements of cautious optimism and critical reflection. While expressing hope for positive change in addressing the crisis and emphasizing collaborative efforts, its narratives around refugees indicates a recognition of the challenges and negative perceptions surrounding the issue. This mixed stance allows Reuters to provide a comprehensive view of the complexities and differing attitudes towards Ukrainian refugees within Western nations.

7. Conclusion

Adopting a methodology embracing both computational and qualitative approaches, this study analyzes news coverage of the Russia–Ukraine conflict from Reuters and Xinhua between 2022 and 2023. The investigation revealed some variations in their monthly number of reports, patterns in the important entities mentioned, and the major thematic focus. Furthermore, discernible differences were observed in the use of emotive language between the two news agencies. Notably, Xinhua demonstrated a substantially higher usage of emotion words linked to Anticipation and Sadness, which served to convey its evaluation and stance on certain geographical actors and sensitive global issues. These findings offer valuable insights regarding the presence of emotions in the news discourse and how the combined influence of ideology and socio-cultural context shapes news framing.

However, it is essential to acknowledge the limitations inherent in this study. The analysis was confined to a specific timeframe and a selected set of media sources. Expanding the scope to include a broader array of media platforms and examining a longer duration may provide further insights into the evolution of media discourse during prolonged conflicts. Furthermore, for the part of emotional computation, this study relied on existing emotion lexicons, which are mainly for general use, and may not perfectly suit the investigation of news discourse. Future research is encouraged to explore two key directions. One potential avenue is diachronic studies focusing on the changing pattern of emotions. By analyzing news reports from different time periods, researchers can identify shifts in the deployment of emotional language. Another direction is the integration of multimodality, incorporating not only textual analysis but also visual elements such as images and videos to gain a more

comprehensive understanding of how emotions are constructed and conveyed in news media.

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Notes

1. Xinhua is an official state-run news agency of the People's Republic of China. Established in 1931, it has been responsible for disseminating news and information that aligns with the government's principles and policies. Xinhua has an extensive network of correspondents both within China and abroad, enabling it to provide comprehensive coverage of domestic and international news.
2. Factiva is a comprehensive and widely recognized news database that serves as a valuable resource for researchers and analysts. Developed by Dow Jones, Factiva offers access to over 32,000 global news sources, including newspapers, magazines, trade publications, and online news platforms. It can be accessed by visiting the website https://www.dowjones.com/professional/zn/factiva/.
3. NRC Word-Emotion Association Lexicon is available at https://saifmohammad.com/WebPages/NRC-Emotion-Lexicon.htm.
4. NRC Affect Intensity Lexicon is available at https://saifmohammad.com/WebPages/AffectIntensity.htm.
5. NLTK (Natural Language Toolkit) is a comprehensive Python library for text analysis. It provides tools and resources for various NLP tasks, including tokenization, stemming, part-of-speech tagging, syntactic parsing, sentiment analysis, and more.
6. jieba is a widely-adopted Python library for Chinese text segmentation and part-of-speech tagging.
7. TextBlob is a Python library for sentiment analysis, part-of-speech tagging, and other tasks. Built on top of NLTK, it provides an easy-to-use API for natural language processing tasks.
8. SnowNLP is a python library specifically designed for processing Chinese text. It focuses on sentiment analysis, keyword extraction, and language model training.
9. The official website is https://www.unhcr.org/.

References

Adegbola, O., Gearhart, S., and Cho, J. (2022) 'Reporting Bias in Coverage of Iran Protests by Global News Agencies', *The International Journal of Press/Politics*, **27**: 138–57. https://doi.org/10.1177/1940161220966948

Al Maruf, A. *et al.* (2023) 'Emotion Detection from Text and Sentiment Analysis of Ukraine Russia War Using Machine Learning Technique', *International Journal of Advanced Computer Science and Applications*, **13**: 346. https://doi.org/10.1007/s42979-023-01790-5

Aslan, S. (2023) 'A Deep Learning-Based Sentiment Analysis Approach (MF-CNN-BILSTM) and Topic Modeling of Tweets Related to the Ukraine-Russia Conflict', *Applied Soft Computing*, **143**: 1–14. https://doi.org/10.1016/j.asoc.2023.110404

Baccianella, S., Esuli, A., and Sebastiani, F. (2010) 'SentiWordNet 3.0: An enhanced lexical resource for sentiment analysis and opinion mining', in *Proceedings of the Seventh International Conference on Language Resources and Evaluation (LREC'10)*. Valletta, Malta, 17–23 May. http://www.lrec-conf.org/proceedings/lrec2010/pdf/769_Paper.pdf (accessed 5 August 2023).

Bednarek, M. (2008) *Emotion Talk across Corpora*. Hampshire: Palgrave Macmillan.

Bednarek, M., and Caple, H. (2012) *News Discourse*. London/New York: Continuum.

Benamara, F., Taboada, M., and Mathieu, Y. (2017) 'Evaluative Language Beyond Bags of Words: Linguistic Insights and Computational Applications', *Computational Linguistics*, **43**: 201–64.

Biber, D., and Finegan, E. (1988) 'Adverbial Stance Types in English', *Discourse Processes*, **11**: 1–34.

Boukes, M., Jones, N. P., and Vliegenthart, R. (2022) 'Newsworthiness and Story Prominence: How the Presence of News Factors Relates to Upfront Position and Length of News Stories', *Journalism*, **23**: 98–116. https://doi.org/10.1177/1464884919899313

Crossley, S. A., Kyle, K., and McNamara, D. S. (2017) 'Sentiment Analysis and Social Cognition Engine (SEANCE): An Automatic Tool for Sentiment, Social Cognition, and Social-Order Analysis', *Behavior Research Methods*, **49**: 803–21. https://doi.org/10.3758/s13428-016-0743-z

Engelmann, I., Luebke, S. M., and Kessler, S. H. (2021) 'Effects of News Factors on Users' News Attention and Selective Exposure on a News Aggregator Website', *Journalism Studies*, **22**: 780–98. https://doi.org/10.1080/1461670X.2021.1889395

Guerra, A., and Karakus, O. (2023) 'Sentiment Analysis for Measuring Hope and Fear from Reddit Posts during the 2022 Russo-Ukrainian Conflict', *Frontiers in Artificial Intelligence*, **6**: 1–16. https://doi.org/10.3389/frai.2023.1163577

Guo, J. (2022) 'Deep Learning Approach to Text Analysis for Human Emotion Detection from Big Data', *Journal of Intelligent Systems*, **31**: 113–26.

Hunston, S. (2011) *Corpus Approaches to Evaluation: Phraseology and Evaluative Language*. New York: Routledge.

Hunston, S., and Thompson, G. (2000) *Evaluation in Text: Authorial Distance and the Construction of Discourse*. Oxford: Oxford University Press.

Martin, J.R., and White, P. (2005) *The Language of Evaluation: Appraisal in English*. New York: Palgrave.

Mestre-Mestre, E. M. (2023) 'Emotion in Politics in Times of War: A Corpus Pragmatics Study', *Corpus Pragmatics*, **7**: 323–44. https://doi.org/10.1007/s41701-023-00147-w

Mohammad, S. M. (2018) 'Word affect intensities', in *Proceedings of the 11th Edition of the Language Resources and Evaluation Conference (LREC-2018)*, Miyazaki, Japan, 7–12 May. https://aclanthology.org/L18-1027.pdf (accessed 5 August 2023).

Mohammad, S. M. (2023) 'Best practices in the creation and use of emotion lexicons', in *Findings of the Association for Computational Linguistics: EACL 2023*, Dubrovnik, Croatia, 2–6 May 2023. https://aclanthology.org/2023.findings-eacl.136.pdf (accessed 5 August 2023).

Mohammad, S. M., and Turney, P. D. (2010) 'Emotions evoked by common words and phrases: using mechanical Turk to create an emotion lexicon', in *Proceedings of the MAACM-HLT 2010 Workshops on Computational Approaches to Analysis and Generation of Emotion in Text*, LA, California, 11–16 July. https://aclanthology.org/W10-0204 (accessed 7 August 2023).

Mohammad, S. M., and Turney, P. D. (2013) 'Crowdsourcing a Word-Emotion Association Lexicon', *Computational Intelligence*, **29**: 436–65. https://doi.org/10.1111/j.1467-8640.2012.00460.x

Pantti, M. (2010) 'The Value of Emotion: An Examination of Television Journalists' Notions on Emotionality', *European Journal of Communication*, **25**: 168–81. https://doi.org/10.1177/0267323110363653

Pennebaker, J. W., Francis, M. E., and Booth, R. J. (2001) *Linguistic Inquiry and Word Count*. Mahwah: Erlbaum Publishers.

Plutchik, R. (1994). *The Psychology and Biology of Emotion*. Glasgow: HarperCollins College Publishers.

Ptaszek, G., Yuskiv, B., and Khomych, S. (2024) 'War on Frames: Text Mining of Conflict in Russian and Ukrainian News Agency Coverage on Telegram during the Russian Invasion of Ukraine in 2022', *Media, War & Conflict*, **17**: 41–61. https://doi.org/10.1177/17506352231166327

Ranganathan, H., Chakraborty, S., and Panchanathan, S. (2016) 'Multimodal emotion recognition using deep learning architectures', in *Proceedings of 2016 IEEE Winter Conference on Applications of Computer Vision (WACV)*, NY, USA, 7–10 Mar, pp. 1–9. https://ieeexplore.ieee.org/document/7477679

Schudson, M. (2001) 'The Objectivity Norm in American Journalism', *Journalism*, **2**: 149–70. https://doi.org/10.1177/146488490100200201.

Strapparava, C., and Valitutti, A. (2004) 'WordNet affect: an affective extension of WordNet', in *Proceedings of the Fourth International Conference on Language Resources and Evaluation (LREC'04)*, Lisbon, Portugal, 26–28 May, pp. 1083–86. http://www.lrec-conf.org/proceedings/lrec2004/pdf/369.pdf

Van Dijk, T. A. (1988a) *News as Discourse*. New York: Erlbaum.

Van Dijk, T. A. (1988b) *News Analysis*. New York: Erlbaum.

Van Dijk, T. A. (1993) 'Principles of Critical Discourse Analysis', *Discourse & Society*, **4**: 249–83.

Van Dijk, T. A. (2006) 'Ideology and Discourse Analysis', *Journal of Political Ideologies*, **11**: 115–40. https://doi.org/10.1080/13569310600687908

Vyas, P., Vyas, G., and Dhiman, G. (2023) 'RUemo-The Classification Framework for Russia-Ukraine War-Related Societal Emotions on Twitter through Machine Learning', *Algorithms*, **16**(2): 69. https://doi.org/10.3390/a16020069

Wadhwani, G. K. *et al.* (2023) 'Sentiment Analysis and Comprehensive Evaluation of Supervised Machine Learning Models using Twitter Data on Russia–Ukraine War', *SN Computer Science*, **4**: 346. https://doi.org/10.1007/s42979-023-01790-5

Wahl-Jorgensen, K. (2016) 'Emotion and digital journalism', in: Witschge, T., Anderson, C. W., Domingo, D. and Alfred Hermida, A. (eds) *The SAGE Handbook of Digital Journalism*, pp. 128–43. California: SAGE Publication Ltd.

Wahl-Jorgensen, K. (2019a) *Emotions, Media and Politics*. New Jersey: Wiley.

Wahl-Jorgensen, K. (2019b) 'Questioning the Ideal of the Public Sphere: The Emotional Turn', *Social Media + Society*, **5**: 1–3. https://doi.org/10.1177/2056305119852175

Wetherell, M. (2015) 'Trends in the Turn to Affect: A Social Psychological Critique', *Body & Society*, **21**: 139–66. https://doi.org/10.1177/1357034X14539020

Zappettini, F., Ponton, D. M., and Larina, T. V. (2021) 'Emotionalisation of Contemporary Media Discourse: A Research Agenda', *Russian Journal of Linguistics*, **25**: 586–610. https://doi.org/10.22363/2687-0088-2021-25-3-586-610