

RESEARCH

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**ANALYSIS OF THE ONLINE COMMUNICATION STRATEGY
OF WORLD POLITICAL LEADERS DURING THE WAR IN
UKRAINE (FEBRUARY 24, 2022 - JANUARY 23, 2023)**

**Análisis de la estrategia de comunicación en línea de los líderes
políticos mundiales durante la guerra en ucrania (24 de febrero de 2022
- 23 de enero de 2023)**

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ABSTRACT

This paper studies the online communication strategies of world leaders during the war in Ukraine from February 24, 2022, to January 23, 2023. The research methods involved collecting Twitter data from four leaders using the rtweet package and analyzing it in RStudio. The analysis focused on sentiment indicators using AFINN and NRC methods through syuzhet and SentimentAnalysis packages. The NRC Emotion Lexicon associated words with emotions and sentiments, while the AFINN lexicon rated words for valence. SentimentAnalysis used dictionaries like QDAP, Harvard IV, and Loughran-McDonald. To visualize the data, a word frequency matrix was created using the tm package and projected as a word cloud with the wordcloud package after cleaning the text. The findings indicate that most world leaders communicate via Twitter, and their tweets are mainly positive in tone. The most active communication strategies involve using hashtags related to the issues of the war, retweeting messages from other leaders, and issuing statements about the conflict. The results suggest that the participating leaders position themselves as the voice of the

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nation and emphasize the importance of international solidarity in achieving peace. Furthermore, the study reveals that the leaders are highly engaged in bidirectional communication, with most messages focused on people's safety and the need for a diplomatic solution. The findings of this study could help policymakers understand how online communication plays a role in international conflict resolution as well as how world leaders can effectively use online communication to engage with their public.

Keywords: Communication strategy, Twitter, social media, Joe Biden, Ursula von der Leyen, Volodymyr Zelensky, Jens Stoltenberg, war, Russia, Ukraine.

RESUMEN

Este artículo estudia las estrategias de comunicación en línea de los líderes mundiales durante la guerra en Ucrania desde el 24 de febrero de 2022 hasta el 23 de enero de 2023. Los métodos de investigación consistieron en recopilar datos de Twitter de cuatro líderes utilizando el paquete rtweet y analizarlos en RStudio. El análisis se centró en los indicadores de sentimiento utilizando los métodos AFINN y NRC a través de los paquetes syuzhet y SentimentAnalysis. El léxico de emociones de NRC asoció palabras con emociones y sentimientos, mientras que el léxico de AFINN calificó las palabras según su valencia. SentimentAnalysis utilizó diccionarios como QDAP, Harvard IV y Loughran-McDonald. Para visualizar los datos, se creó una matriz de frecuencia de palabras utilizando el paquete tm y se proyectó como una nube de palabras con el paquete wordcloud después de limpiar el texto. Los hallazgos indican que la mayoría de los líderes mundiales se comunican a través de Twitter, y sus tuits son principalmente de tono positivo. Las estrategias de comunicación más activas involucran el uso de *hashtags* relacionados con los temas de la guerra, retuitear mensajes de otros líderes y emitir declaraciones sobre el conflicto. Los resultados sugieren que los líderes participantes se posicionan como la voz de la nación y enfatizan la importancia de la solidaridad internacional para lograr la paz. Además, el estudio revela que los líderes están muy comprometidos con la comunicación bidireccional, con la mayoría de los mensajes enfocados en la seguridad de las personas y la necesidad de una solución diplomática. Los hallazgos de este estudio podrían ayudar a los formuladores de políticas a comprender cómo la comunicación en línea juega un papel en la resolución de conflictos internacionales y cómo los líderes mundiales pueden usar la comunicación en línea de manera efectiva para interactuar con su público.

Palabras clave: Estrategia de comunicación, Twitter, redes sociales, Joe Biden, Ursula von der Leyen, Volodymyr Zelensky, Jens Stoltenberg, guerra, Rusia, Ucrania.

Análise da estratégia de comunicação em linha dos líderes políticos mundiais durante a guerra na Ucrânia (24 de fevereiro de 2022 - 23 de janeiro de 2023)

RESUMO

Este artigo estuda as estratégias de comunicação em linha dos líderes mundiais durante a guerra na Ucrânia, de 24 de Fevereiro de 2022 a 23 de Janeiro de 2023. Os

métodos de investigação consistiram na recolha de dados do Twitter de quatro líderes utilizando o pacote rtweet e na sua análise no RStudio. A análise centrou-se nos indicadores de sentimento utilizando os métodos AFINN e NRC através dos pacotes syuzhet e SentimentAnalysis. O léxico de emoções NRC associou palavras a emoções e sentimentos, enquanto o léxico AFINN classificou as palavras de acordo com a sua valência. O SentimentAnalysis utilizou dicionários como o QDAP, Harvard IV e Loughran-McDonald. Para visualizar os dados, foi criada uma matriz de frequência de palavras utilizando o pacote tm e projectada como uma nuvem de palavras com o pacote wordcloud após a limpeza do texto. Os resultados indicam que a maioria dos líderes mundiais comunica através do Twitter e que os seus tweets têm sobretudo um tom positivo. As estratégias de comunicação mais activas envolvem a utilização de hashtags relacionadas com questões de guerra, o retweet de mensagens de outros líderes e a emissão de declarações sobre o conflito. Os resultados sugerem que os líderes participantes se posicionam como a voz da nação e sublinham a importância da solidariedade internacional para alcançar a paz. Além disso, o estudo revela que os líderes estão altamente empenhados na comunicação bidireccional, com a maioria das mensagens a centrar-se na segurança das pessoas e na necessidade de uma solução diplomática. As conclusões deste estudo podem ajudar os decisores políticos a compreender como a comunicação em linha desempenha um papel na resolução de conflitos internacionais e como os líderes mundiais podem utilizar a comunicação em linha de forma eficaz para interagir com os seus públicos.

Palavras-chave: Estratégia de comunicação, Twitter, redes sociais, Joe Biden, Ursula von der Leyen, Volodymyr Zelensky, Jens Stoltenberg, guerra, Rússia, Ucrânia

1. INTRODUCTION

As the world continues to rapidly evolve in the digital age, so does the way that political leaders communicate with the public on a day-to-day basis, particularly when dealing with a crisis or emergency situation (Hänska and Bauchowitz, 2019).

Social media, such as Facebook, Twitter, Instagram, and YouTube, have become invaluable tools in the arsenal of the modern-day political leader and are often used to post breaking news information and updates regarding the situation at hand. During times of crisis, using social media to communicate can be a fantastic way to engage with the public, to measure public emotions, to use emotion indicators to develop optimal key messages (Duncombe, 2019), and to ensure that citizens remain informed of any new developments or changes in policy or procedure.

When using social media in a crisis, political leaders need to ensure that all of their posts are up-to-date and accurate, yet also respectful, reassuring, and not overly inflammatory (Drylie-Carey et al., 2020). Regularly updating citizens with accurate, pertinent, and useful information about the unfolding situation is key, as embracing an open and transparent communication style will help to increase trust, build rapport, and eventually strengthen the bond between the leader and followers.

Besides providing vital updates, social media can also be a powerful tool for "crisis management" (Haq et al., 2022), whereby damage control methods, such as showing

empathy and offering clear paths of action, can be used to help minimize the damage done to a leader's reputation in times of crisis. By clearly outlining what actions are going to be taken, personal websites and social media platforms may also be used to ask followers for help or support in areas that are struggling.

Also, political leaders should not underestimate the importance of using social media to interact with their followers as a way to show that they understand their concerns. Making sure to personally respond to inquiries and reassure followers that their well-being is a priority is a great way to aid in crisis communication (London and Matthews, 2022). All in all, social media is a valuable communication tool for political leaders during times of crisis and can help them maintain their connection with the public. By proactively managing their digital presence, political leaders can ensure that their posts during a crisis remain both respectful and informative, as well as providing a platform where followers can get their important questions answered.

Of all modern communication channels, for world political leaders but also for international media institutions, Twitter is one of the most effective because it is fast, convenient, and allows them to reach a large audience in a short amount of time (Tasente, 2023a). It also serves as an important platform for news, updates, and other information to be disseminated quickly (Hagen et al., 2020). Furthermore, it is free and readily accessible worldwide. This has made it one of the primary choices of political leaders, media institutions, and other figures who have a message to share. Twitter has become an influential tool for disseminating news and opinions, giving political leaders and other groups a powerful voice.

Some of the characteristics of crisis communication through Twitter include (Tasente, 2023b):

1. Focused: Political leaders can use Twitter to condense and convey their views in an easily shared format, allowing them to hone in on key points and issues.
2. Immediate: Twitter allows political leaders to quickly disseminate information and quickly respond to current events without the need for a traditional media outlet.
3. Accessible: Twitter is also an accessible platform for political leaders to share messages across language and geographic boundaries.
4. Engaging: Political leaders can leverage Twitter to engage with their constituents, facilitate dialogue, and encourage discussions between citizens.
5. Authentic: Unlike other forms of media, Twitter allows political leaders to remain in-the-moment and authentic with their responses to crisis communication.
6. Expansion: Political leaders can leverage Twitter to expand their digital outreach and broaden the reach of their message in times of crisis.
7. Real-Time: Twitter allows political leaders to respond to events, needs, and queries in real-time and to communicate with audiences in multiple formats.

8. Transparency: Twitter also provides political leaders with a platform to be transparent in their communication and share official statements in crisis situations.

2. OBJECTIVES

O1: Comparative analysis of the evolution of online communication strategy

O2: Comparative analysis of direction and communication style

3. METHODOLOGY

In this study, the choice of the four global leaders: Joe Biden, Ursula von der Leyen, Jens Stoltenberg, and Volodymyr Zelensky; was based on their significance and influence in the context of the Russian invasion of Ukraine from February 24, 2022, to January 23, 2023.

1. Joe Biden, as the President of the United States, represents a significant political force and a key player in the global response to the crisis. The US has been actively involved in supporting Ukraine and coordinating international efforts against Russia's actions.
2. Ursula von der Leyen, as the President of the European Commission, is a central figure in shaping the European Union's response to the conflict. Given the EU's proximity to Ukraine and its strong economic and political ties with the country, the EU's involvement and von der Leyen's leadership are crucial.
3. Jens Stoltenberg, as the Secretary-General of NATO, plays a vital role in coordinating the alliance's response to the situation. NATO has been providing support to Ukraine and working on ensuring the security of its member states, which are directly affected by the crisis.
4. Volodymyr Zelensky, as the President of Ukraine, is the main figure representing the country under invasion. His actions, decisions, and communication are vital in understanding the situation from Ukraine's perspective and the country's resilience against the Russian aggression.

Exclusion criteria for this study were primarily based on the language of the posts. Only the posts written in English were included in the analysis to maintain consistency and facilitate sentiment analysis using the selected lexicons and packages. Posts in other languages or with insufficient context were excluded. Furthermore, retweets and replies were not considered, focusing only on the original content published by the four leaders during the specified time frame.

To collect the data regarding the posts published by Joe Biden, Ursula von der Leyen, Jens Stoltenberg, and Volodymyr Zelensky via Twitter, we used the rtweet package (Kearney et al., 2023), and for data analysis, we used the RStudio program. After centralizing the data, we selected the period from February 24, 2022, to January 23, 2023, and filtered only the posts written in English.

To analyze the sentiment indicators of the posts published by Joe Biden, Ursula von der Leyen, Jens Stoltenberg, and Volodymyr Zelensky on Twitter, we used two research methods, AFINN and NRC, with the help of the *syuzhet* (Jockers, 2020) and *SentimentAnalysis* (Proellocks and Feuerriegel, 2021) packages in RStudio. To evaluate the sentiment of English-language posts, we used the NRC Emotion Lexicon, which has manually annotated the association of English words with eight basic emotions (anger, fear, anticipation, trust, surprise, sadness, joy, and disgust) and two sentiments (negative and positive). The AFINN lexicon contains a list of English terms manually rated for valence, with a range of -5 (negative) to +5 (positive). Additionally, we used the *SentimentAnalysis* package, which utilizes existing dictionaries such as QDAP, Harvard IV, and Loughran-McDonald.

To create a word frequency matrix and project it in the form of a word cloud, we used the *tm* (Feinerer et al., 2022) and *wordcloud* (Fellows, 2018) packages. First, we collected the online speeches of the three leaders, and then we cleaned up the text by removing numbers, special characters, punctuation, links, prepositions, and other connecting words.

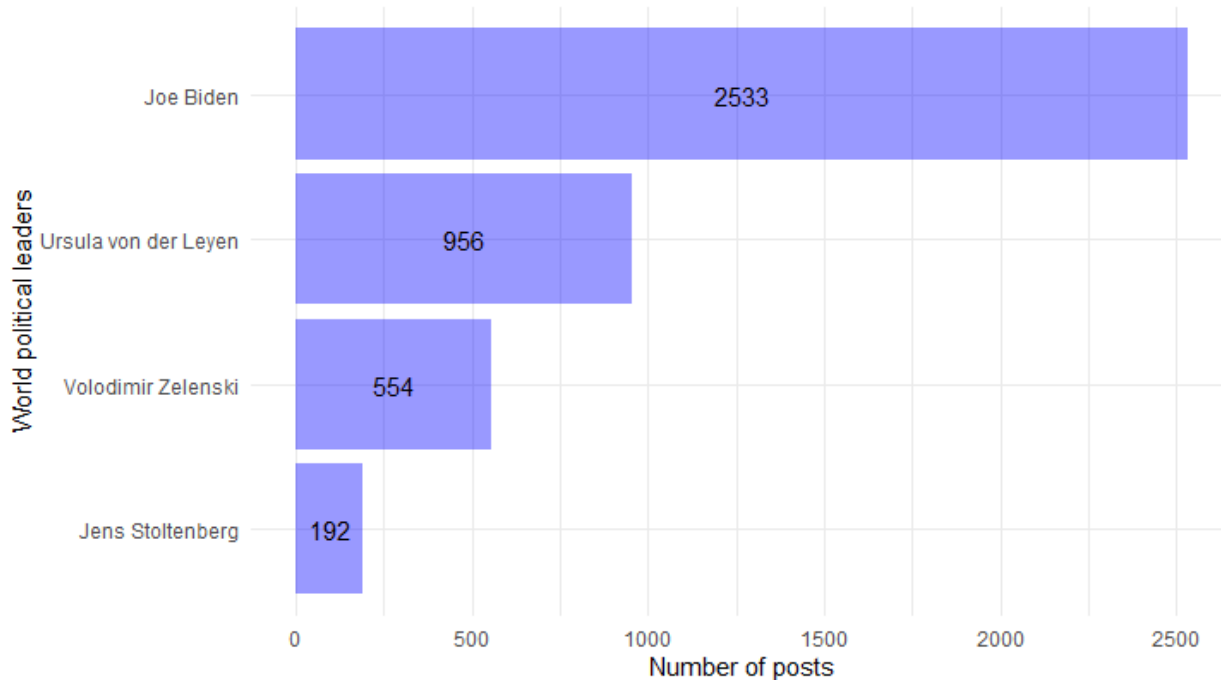
4. RESULTS

The comparison of the number of posts published on Twitter by the four heads of state reveals how active each of these individuals is in using the platform for political and social communication. Joe Biden (President of the United States of America) is the most active of the four, with 2533 posts in the monitored period, followed by Ursula von der Leyen (President of the European Commission) with 956 posts, Volodymyr Zelensky (President of Ukraine) with 554 posts and Jens Stoltenberg (Secretary General of NATO) with 192 posts. While these numbers clearly demonstrate that Joe Biden is much more active than the others on Twitter, it is important to note that other methods of communication and engagement may be used by these four world leaders for related purposes.

Even so, in the case of Joe Biden, out of 2533 posts, 57 of them mention the word "Ukraine", which represents a percentage of 2.25%. On the other hand, Ursula von der Leyen mentions "Ukraine" in 282 out of 956 posts (29.50%), Jens Stoltenberg mentions it in 107 out of 192 posts (55.73%), and Volodymyr Zelensky mentions it in 199 out of 554 posts (34.92%). Joe Biden and Ursula von der Leyen have a more varied media presence than Jens Stoltenberg and Volodymyr Zelensky, as the former are charged with the responsibility of informing the public about an array of domestic issues, including energy policy, inflation, and price increases, in addition to security topics and warfare.

Figure 1

The number of posts published on Twitter between February 24 and January 23, 2023.



Source: Own elaboration.

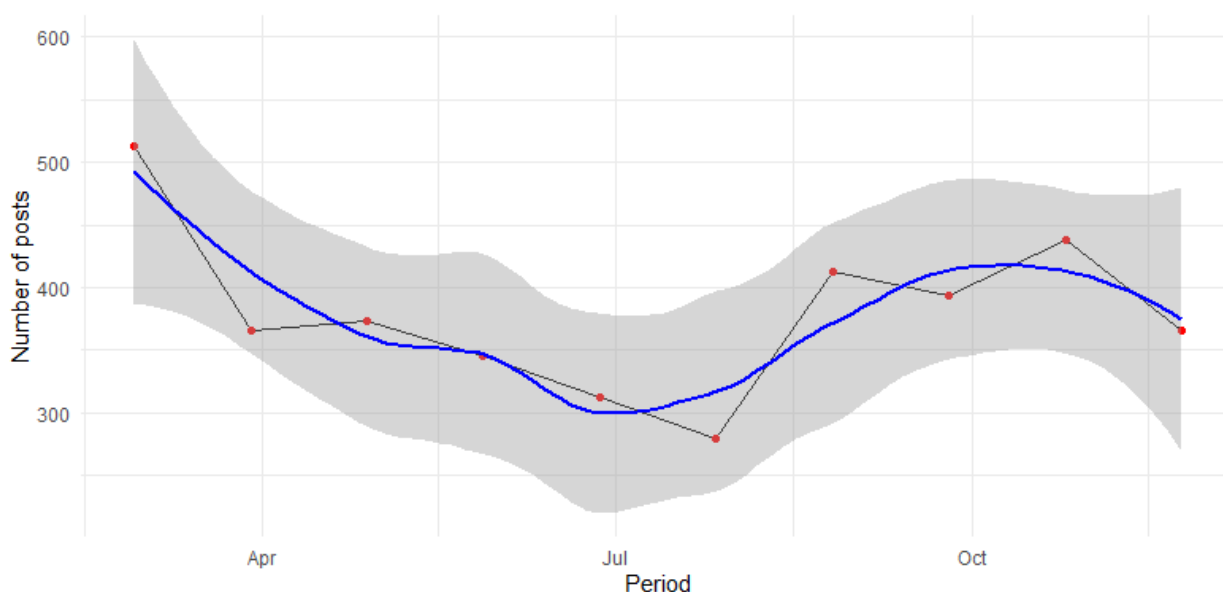
4.1. The chronological evolution of posts

According to the graph below, we can see that there was intense communication activity on Twitter during the invasion of the Army of the Russian Federation in Ukraine (in February and mid-March 2022), but this activity decreased considerably between April and August 2022. However, the cumulative communication activity of the four analyzed leaders experienced an increase between September 2022 and the end of December 2022.

There are several possible explanations for this increase in communication activity from September to December 2022. One possible explanation could be that, as the Ukrainian conflict continued, the leaders involved sought to strengthen their positions and increase international support. Therefore, they may have used social media to reach a wider audience and boost their public profiles. Additionally, this period may have marked an increase in diplomatic activity as leaders aired their grievances and opened negotiations for a resolution to the conflict. As the leaders discussed how to best move forward, their increased communication activity on social media likely reflected the importance of the situation.

Figure 2

The chronological evolution of posts.



Source: Own elaboration.

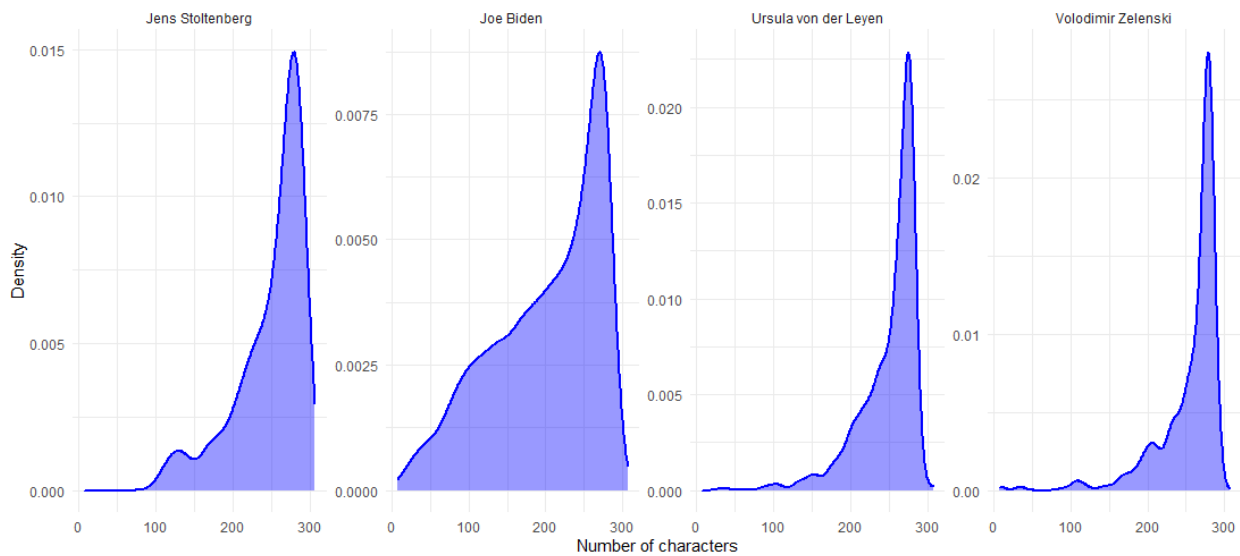
4.2. Text range

Twitter post length is an important factor in global political communication. Short, concise posts are vital for politicians to communicate with large audiences, as they constitute the primary source of communication between them and the public. In addition, short messages allow for more information to be conveyed faster, enabling politicians to reach more people with their message in a shorter amount of time. Furthermore, Twitter posts of 140 characters or less are easier to remember and share, increasing the reach of key messages. Finally, by keeping posts short, politicians can create more engaging content while still conveying their message effectively. However, during the crisis, longer Twitter posts are recommended, as the accuracy of the information and the detailed arguments are strong points in achieving the communication objectives.

The longest posts are submitted by Volodymyr Zelensky, with an average of 255.6 characters per post, followed by Ursula von der Leyen (average of 249.6 characters per post), Jens Stoltenberg (average of 249.0 characters per post), and Joe Biden (average of 200 characters per post).

Figure 3

Text range.



Source: Own elaboration.

4.3. Discursive analysis according to the AFINN method

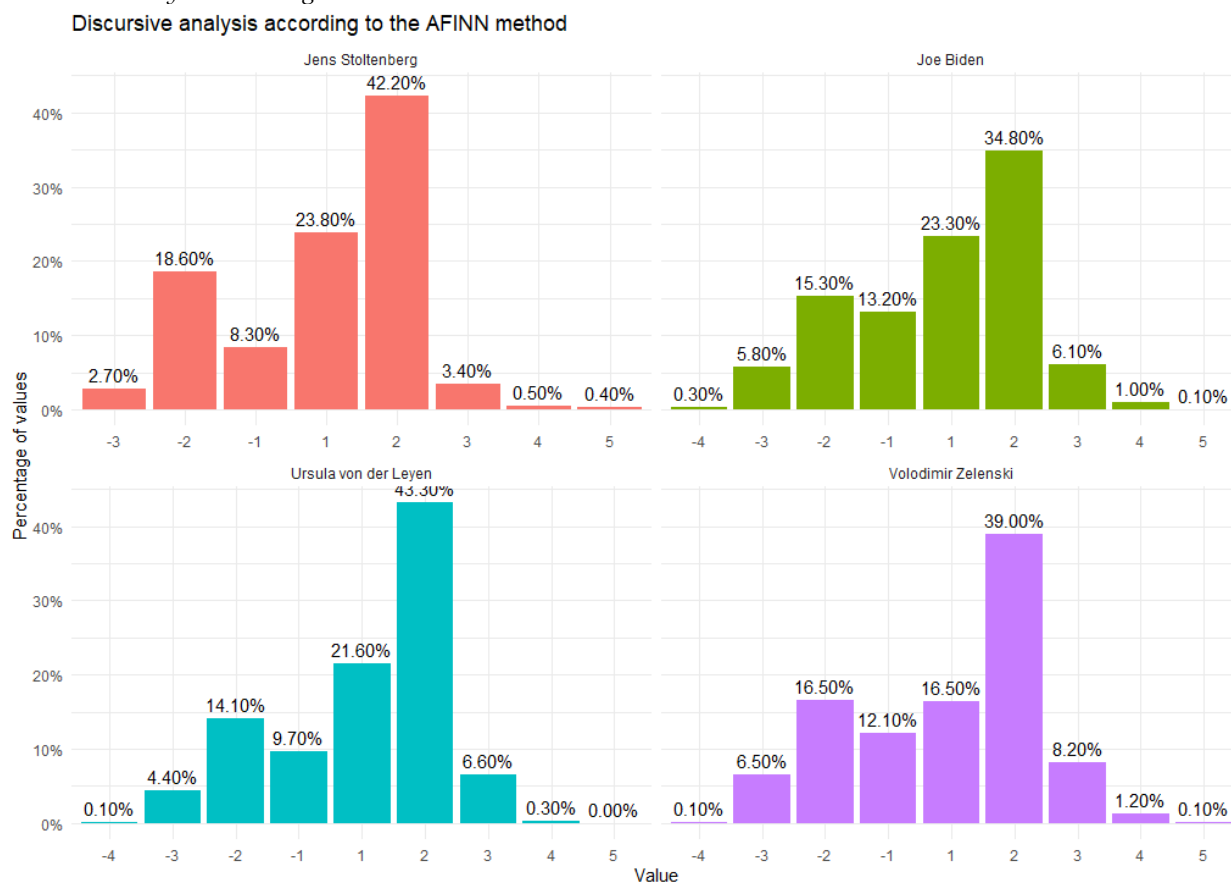
Analyzing the online communication strategies using the AFINN method, we reached the following conclusions:

- Jens Stoltenberg focuses his public speech mostly on positive words: +1 (23.8%), +2 (42.20%), but also on words with negative connotations: -1 (8.30%), and -2 (18.60%).
- Ursula von der Leyen focuses her online speech on positive words, of +1 (21.60%), +2 (43.30%), but also on negative words, in a smaller proportion, of -1 (9.30%) and -2 (14.10%).
- Volodymir Zelensky focuses his public speech, to a large extent, on positive words: +1 (16.50%), +2 (39.00%), and +3 (8.20%), but also on negative words: -1 (12.10%), -2 (16.50%), and -3 (6.50%).
- Joe Biden focuses his speech, mostly on positive words, +1 (22.30%), +2 (34.80%), but also on negative words, -1 (13.20%) and -2 (15.3%).

Based on our analysis, we can conclude that all four leaders use positive words more frequently for their online communications in a crisis, which suggests that optimism may be the best approach when communicating in these situations. This is likely since being positive can help reassure an anxious public and boost morale in times of uncertainty. Additionally, leaders should be aware that their words carry a lot of weight and should not be taken lightly. Thus, they must be careful to ensure their messages are accurate, credible, and consistent.

Figure 4

Discursive analysis according to the AFINN method.



Source: Own elaboration.

4.4. Discursive analysis according to the NRC method

According to the NRC analysis, we can observe the following:

- Jens Stoltenberg focuses his public discourse, in a very large proportion, on positive words (30.20%), only 15.00% of the words being negative. From the point of view of the emotions transmitted, we observe that 19.00% transmit trust, 9.90% fear, 8.70% anticipation, 6.60% anger, 4.40% joy, 2.30% sadness, 2.20% disgust and only 1.70% surprise.

- Joe Biden focuses his speech on positive messages (26.20%), only 12.10% of the words used in the speech are negative. At the same time, 17.20% of the words convey trust, 10.20% anticipation, 8.60% fear, 8.00% joy, 5.60% anger, 5.40% sadness, 3.40% surprise and 2.50% disgust.

- Ursula von der Leyen focuses her public speech on positive messages (32.80%) and messages of trust (19.20%), followed by anticipation (10.70%), negative words (9.70%) and joy (8.70%). At the opposite pole we find words that convey fear (7.20%), anger (4.70%), surprise (3.00%), sadness (2.60%) and disgust (1.50%).

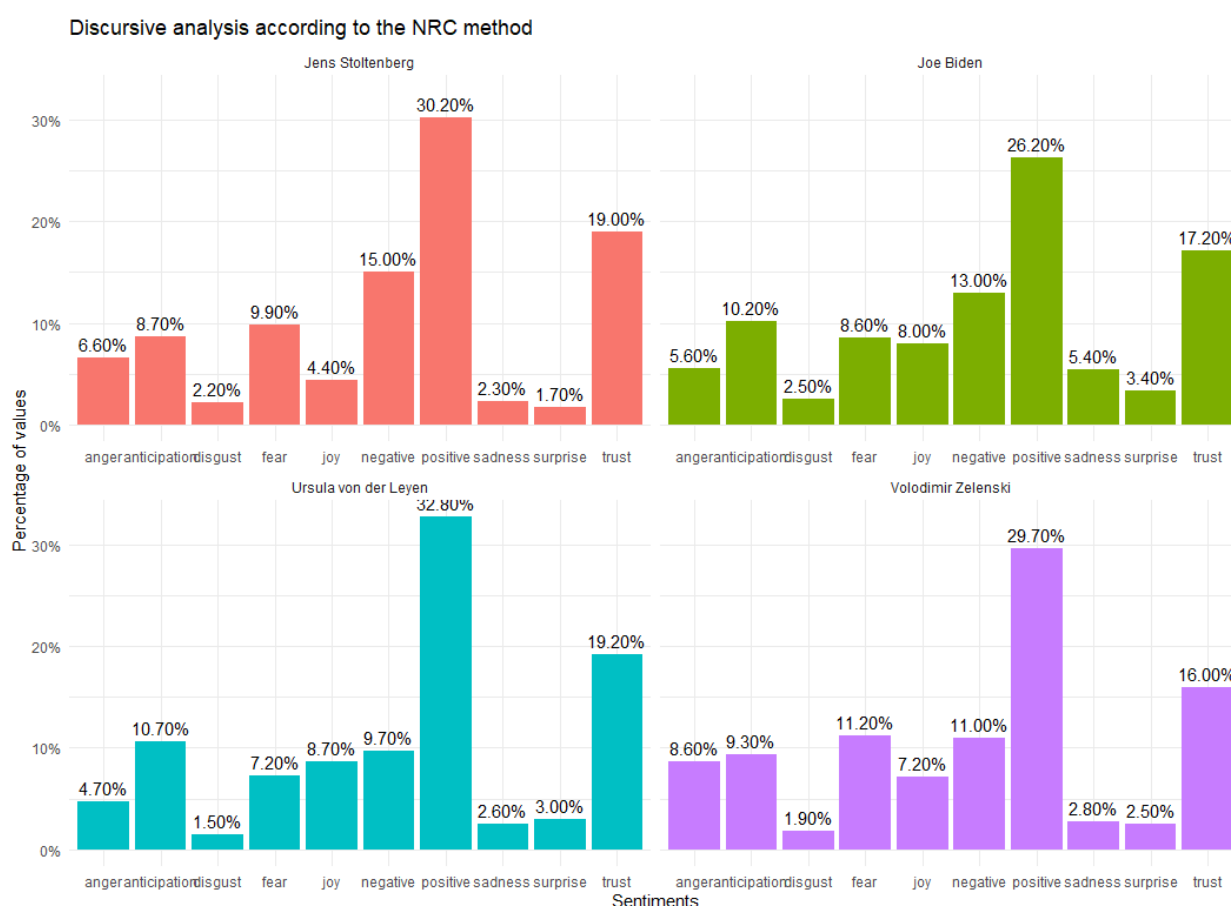
- Volodymir Zelenski focuses his public discourse on positive messages (29.70%) and

messages that convey trust (16.00%), followed by messages that convey fear (11.20%), negative messages (11.00%), anticipation (9.30%), anger (8.60%), joy (7.20%), sadness (2.80%), surprise (2.50%) and disgust (1.90%).

These results suggest that all four leaders are focusing their online communication strategies in a crisis situation on positive and trusting messages as a way to show solidarity with their target audiences and boost morale, while still acknowledging the seriousness of the situation. Additionally, all four display a notable difference between their use of positive and negative words, with the former far outnumbering the latter. This suggests a conscious effort on the part of each leader to use language that emphasizes the hope of an eventual recovery rather than the fear and anxiety associated with the present situation.

Figure 5

Discursive analysis according to the NRC method.



Source: Own elaboration.

4.5. Analysing the sentiment indicator in public discourse

Analysing the sentiment indicator of all the posts of the 4 leaders, we can see that its average is +0.06822 (on a scale from -1 to +1), the median is +0.07, the post with the lowest sentiment indicator was -0.37500, the post with the highest sentiment indicator was +0.5, the first quartile is +0.01316, and the third quartile is 0.1250.

Table 1

Analysing the sentiment indicator of all the posts of the 4 leaders.

Leader	Min.	1st Qu.	Median	Mean	3rd Qu.	Max.
Joe Biden	-0.27778	0.00000	0.05556	0.05568	0.11000	0.50000
Ursula von der Leyen	-0.21875	0.04167	0.08696	0.08429	0.13462	0.27381
Jens Stoltenberg	-0.1667	0.0431	0.1023	0.0895	0.1463	0.2344
Volodymir Zelensky	-0.37500	0.03750	0.09045	0.09043	0.14773	0.50000

Source: Own elaboration.

In the case of Joe Biden, the sentiment indicator of his speech is, on average, +0.05556, median = +0.05556, the post with the lowest sentiment indicator has -0.27778, the post with the highest sentiment indicator has +0.5, the first quartile is 0, and the third quartile is +0.11.

On the other hand, the sentiment indicator of Ursula von der Leyen's speech is, on average, +0.08429, median = +0.08696, the post with the lowest sentiment indicator has -0.21875, the post with the highest sentiment indicator has +0.27381, the first quartile is +0.04167, and the third quartile is +0.13462.

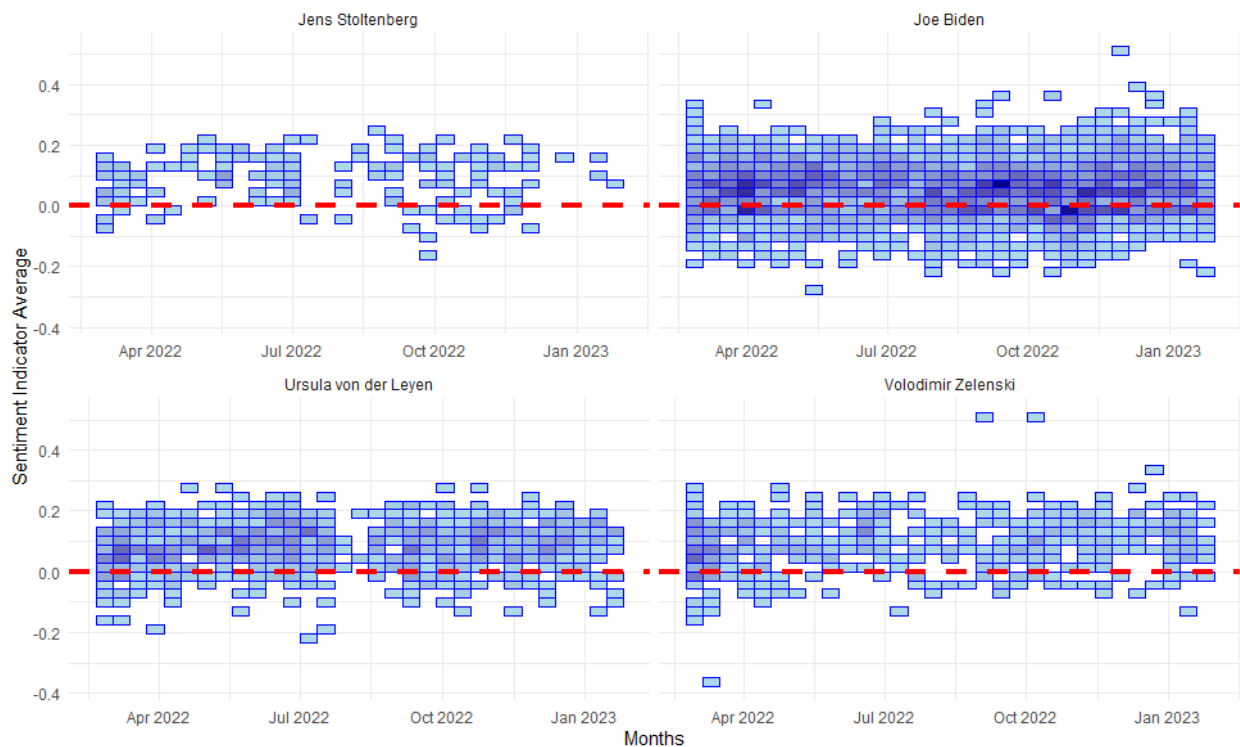
In the case of Jens Stoltenberg's public speech, the mean sentiment indicator is +0.0895, the median is +0.1023, the post with the lowest sentiment indicator is -0.1667, the post with the highest sentiment indicator is +0.2344, the first quartile has +0.0375, and the third quartile has +0.14773.

In the case of Volodymir Zelensky, the sentiment indicator of his speech is, on average, +0.09043, median = +0.09045, the post with the lowest sentiment indicator has -0.375, the post with the highest sentiment indicator has +0.5, the first quartile is +0.0375, and the third quartile is +0.14773.

Overall, the sentiment indicators suggest that all four politicians speak in a positive way in their public speeches. All four have mean sentiment indicators of above 0.05 and medians of above 0.08, indicating that a majority of the sentiment of their words is positive. Additionally, their lowest sentiment scores were each negative, but still relatively close to 0.

Figure 6

Analysing the sentiment indicator in public discourse.



Source: Own elaboration.

4.6. Comparative analysis of the most frequently used words in online discourse

The analysis of the keywords used by the four prominent leaders provides insight into their priorities and the issues they deem important. While the four leaders come from different countries and hold different positions, their use of language highlights their concerns and objectives. This analysis highlights the importance of analyzing the language used in public discourse and the role it plays in shaping public opinion.

Jens Stoltenberg, the Secretary-General of NATO, focuses his speeches on defense and security, highlighting the importance of NATO in maintaining peace and stability in the region. The keywords he uses, such as NATO, allies, Ukraine, war, and defense, indicate that he is focused on the ongoing conflict in Ukraine and the threat posed by Russia's aggressive regional policies. Stoltenberg emphasizes the role of NATO in providing a collective defense for its members and emphasizes the need for member countries to contribute their fair share to the alliance. Stoltenberg's use of keywords suggests that he sees NATO as a critical component in maintaining peace and security in the region.

Joe Biden, the President of the United States, focuses his speeches on domestic policies, particularly economic issues. His use of keywords such as "family, Americans, jobs, inflation, economy, prices, taxes," indicates that he is concerned with the economic challenges facing the American people. Biden emphasizes the need for policies that support American families and create jobs, while also addressing issues such as inflation and rising prices. Biden's language suggests that he sees domestic policies as

a priority for his administration.

Ursula von der Leyen, the President of the European Commission, focuses her speeches on environmental issues and European energy policies. Her use of keywords such as "energy, climate, fossil, gas, repowerEU", indicates that she is committed to the fight against climate change and the need to transition to renewable energy sources. Von der Leyen emphasizes the importance of the European Union's role in leading the global fight against climate change and promoting sustainable development. Von der Leyen's use of keywords suggests that she sees environmental issues as a critical priority for the European Union.

Volodymyr Zelensky, the President of Ukraine, focuses his speeches on support and cooperation. His use of keywords such as "support, defense, aggression, Russian, grateful, conversation, cooperation, humanitarian, sanctions, assistance, aid," indicates that he is focused on Ukraine's reliance on the international community for military and economic support. Zelensky emphasizes the need for support and cooperation in defending Ukraine against Russian aggression and promoting humanitarian aid to those affected by the conflict. Zelensky's language suggests that he sees international support as critical to Ukraine's future.

Comparing the four leaders' language, each one emphasizes different priorities. Stoltenberg's focus on defense and security is in sharp contrast to Biden's emphasis on domestic policies. Von der Leyen's commitment to environmental issues is very different from Zelensky's focus on support and cooperation. These differences reflect the diverse priorities of different leaders and highlight the importance of language in shaping public opinion and policy.

Analyzing the most used keywords in public discourse is critical in understanding how leaders shape public opinion and policy. The language they use reflects their priorities and concerns and can have a significant impact on the public's perception of issues. Analyzing the language used by leaders can also help identify emerging trends and issues that may require attention. For example, if there is a sudden increase in the use of keywords related to a particular issue, it may indicate that the issue is becoming more salient and requires action.

In conclusion, analyzing the language used by leaders in public discourse is essential in understanding their priorities and concerns. The analysis of the keywords used by Jens Stoltenberg, Joe Biden, Ursula von der Leyen, and Volodymyr Zelensky provides valuable insight into the issues that matter most to them and the policies they are likely to prioritize. This analysis also highlights the importance of language in shaping public opinion and policy, as the language used by leaders can influence the public's perception of issues.

Furthermore, the analysis of the keywords used by these four leaders underscores the importance of understanding the context in which they are speaking. Each leader comes from a different country and holds a different position, and their language reflects their unique circumstances and priorities. For example, Stoltenberg's focus on

defense and security is likely influenced by the ongoing conflict in Ukraine and Russia's aggressive regional policies, while Biden's emphasis on domestic policies is likely influenced by the urgent economic concerns facing the American people.

Moreover, this analysis also highlights the role of language in international relations. The language used by leaders in public discourse can have a significant impact on their relationships with other countries and the international community. For example, the language used by Zelensky in his speeches on support and cooperation can help to build alliances and strengthen Ukraine's relationships with other countries.

In addition, the analysis of the keywords used by these leaders can provide valuable insights into emerging trends and issues. For example, the increasing use of keywords related to climate change and renewable energy in von der Leyen's speeches suggests that these issues are becoming more salient and may require greater attention from policymakers.

Overall, the analysis of the keywords used by Jens Stoltenberg, Joe Biden, Ursula von der Leyen, and Volodymyr Zelensky in their public discourse provides valuable insights into their priorities and concerns. The language used by leaders in public discourse is critical in shaping public opinion and policy and can have a significant impact on international relations. Therefore, it is essential to continue to analyze the language used by leaders in public discourse to gain a better understanding of their priorities and the issues that matter most to them.

Figure 7

Comparative analysis of the most frequently used words in online discourse.



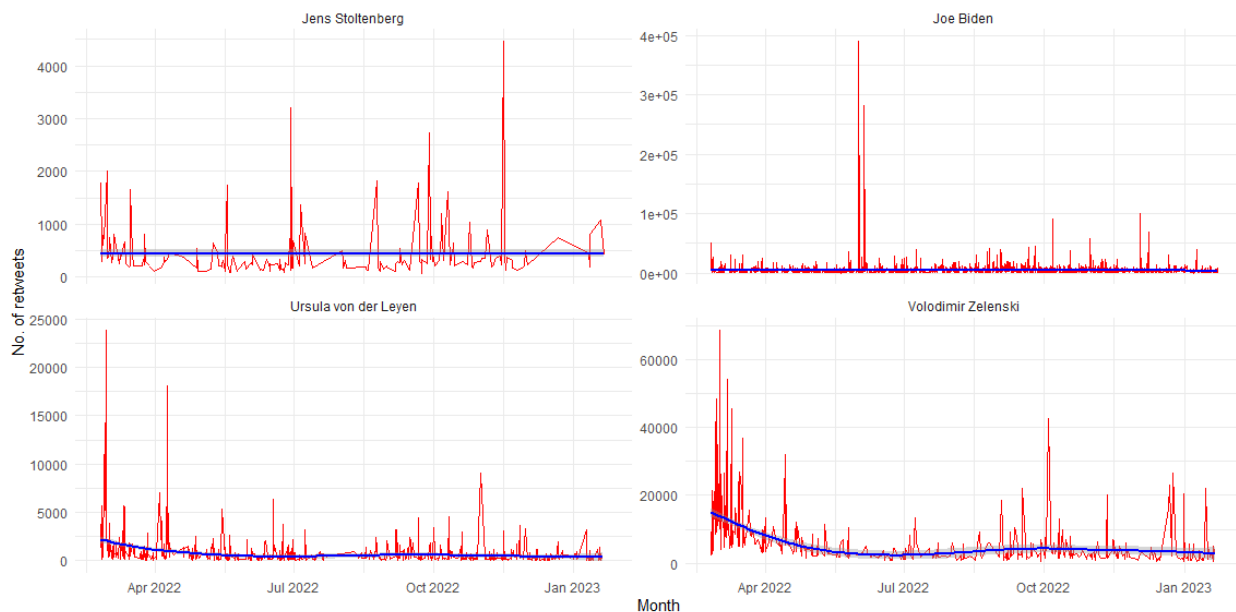
Source: Own elaboration.

degree of decentralization of communication in a given social group, as it enables the broadcaster to transmit the message to a much larger number of people, by utilizing the intermediaries of the social network.

By retweeting, audience members can indicate their agreement or approval with what has been posted or pass on ideas or information to people who may not have seen them otherwise. This helps to create a larger audience for the initial tweet, which can lead to positive feedback for the original tweeter and also prompt further responses and interactions across the network. Retweets can also indicate support; a retweet from a person with a high following may lend legitimacy and additional attention to a particular idea or opinion. Additionally, it can provide context and additional meaning to the conversation taking place if done thoughtfully and respectfully.

Figure 9

Retweets evolution during the crisis.



Source: Own elaboration.

Comparing Joe Biden's decentralization of communication to that of the other world leaders analyzed in the data, it is clear that Biden's strategy is particularly effective in the realm of social media communication. However, it is important to consider the context in which each leader operates and the specific goals they may have for their communication strategies. For example, while Zelensky's average of 6112 retweets per post is lower than Biden's, it is still significantly higher than von der Leyen's and Stoltenberg's, indicating a higher degree of communication decentralization than these two leaders.

In the case of Volodymyr Zelensky, the higher number of retweets per post can be partially attributed to his position as the president of Ukraine during a time of intense conflict with Russia. During the ongoing crisis in Ukraine, Zelensky has used Twitter as a means of communicating with both domestic and international audiences about

developments in the conflict, as well as to rally support for his government's actions. The fact that Zelensky's median retweet count is only slightly higher than Biden's, while his maximum retweet count is significantly lower, suggests that he has a smaller core group of dedicated followers who are more likely to retweet his messages than Biden's followers are. However, the relatively high first and third quartiles for Zelensky's retweet counts indicate that his messages have the potential to reach a broader audience than those of von der Leyen or Stoltenberg.

Looking at Ursula von der Leyen's communication strategy, the data shows that her level of decentralization is significantly lower than that of the other leaders analyzed. This is likely due in part to the fact that she is not a head of state, but rather the President of the European Commission, which is a bureaucratic organization rather than a political one. Additionally, her relatively low retweet counts may reflect the fact that she is not a particularly high-profile or controversial figure, and therefore her messages may not inspire the same degree of engagement and reaction as those of more prominent leaders.

Finally, Jens Stoltenberg's low retweet counts can be partially explained by the fact that he is the Secretary General of NATO, rather than a head of state or national government. As an international organization, NATO's messages may be less likely to generate widespread engagement on social media than the messages of individual leaders. Additionally, Stoltenberg's relatively low profile as an individual figure may contribute to his lower retweet counts.

Overall, it is important to note that retweet counts do not provide a comprehensive picture of a leader's communication strategy or their effectiveness in achieving their goals. However, the data does suggest that Biden and Zelensky's communication strategies have been particularly successful in generating engagement and mobilizing support on social media, while von der Leyen and Stoltenberg's strategies have been less effective in this regard.

Turning specifically to the situation in Ukraine and the invasion by the Russian Federation, it is notable that retweet counts for all four leaders spiked significantly in the days following the start of the invasion. This suggests that social media played an important role in spreading news and commentary about the conflict, and that retweets were a key mechanism for disseminating information to a wider audience. Additionally, the fact that Zelensky's highest retweet count was achieved during this time suggests that his messages about the conflict resonated particularly strongly with his followers and with the broader public.

In the case of Biden, his high levels of decentralization and engagement on social media may have helped to amplify his messaging about the conflict and to draw attention to the United States' response to the invasion. Retweets from influential accounts may have helped to signal to the international community that the US was taking a strong stance against the invasion, and to mobilize support for sanctions or other actions against Russia. Additionally, the high level of engagement on social media may have helped to shape public opinion about the conflict and to counter disinformation or

propaganda being spread by Russian state media or other actors.

It is also worth considering the role that retweets and social media more broadly have played in shaping the conflict in Ukraine and in international relations more generally. Social media platforms like Twitter have provided a new and powerful tool for leaders and citizens to communicate with one another and to shape public opinion. However, they have also created new challenges and risks, including the spread of disinformation and the potential for manipulation by hostile actors. In the case of the Ukraine conflict, both the Ukrainian government and the Russian Federation have been accused of using social media to spread propaganda and to influence public opinion.

Furthermore, the use of retweets as a measure of decentralization and engagement on social media may have limitations. While retweets can provide some indication of the reach and impact of a message, they do not necessarily reflect the quality or depth of engagement. A high number of retweets may simply indicate that a message has gone viral or that it is controversial, rather than that it is well-received or persuasive. Additionally, retweets do not capture other forms of engagement on social media, such as comments or likes, which may provide additional insight into how a message is being received.

In conclusion, the data on retweet counts for Joe Biden, Volodymyr Zelensky, Ursula von der Leyen, and Jens Stoltenberg provides some insight into the effectiveness of their communication strategies and the degree of decentralization of communication in their respective social groups. Biden and Zelensky's high retweet counts suggest that their social media strategies have been particularly successful in generating engagement and mobilizing support, while von der Leyen and Stoltenberg's lower retweet counts may indicate a need for more effective communication strategies. However, it is important to consider the broader context in which these leaders operate, as well as the limitations of using retweets as a measure of engagement on social media.

4.9. Messages of political leaders during the invasion of February 24, 2024

On February 24, 2022, President Biden held talks with his G7 counterparts to discuss the unprovoked and unjustified Russian attack on Ukraine. He called for the leaders of the world to speak out and for the US and its allies to impose severe sanctions on Russia while also providing support and assistance to Ukraine and its people. He also urged people to watch live as he delivers remarks on the matter. That day, Joe Biden published a number of Twitter posts, which generated a number of 61,983 redistributions of followers in their social groups.

On the other hand, on February 24, 2022, the EU strongly condemned Russia's unjustified attack on Ukraine, vowing to hold the Kremlin accountable and adopt further restrictive measures. Leaders of the G7 countries also united in condemning the attack and agreed to impose massive sanctions. Ursula von der Leyen also expressed solidarity with Ukraine and its people, including through the showing of the Ukrainian flag at the Commission headquarters. She also spoke to the President of

Moldova to ensure the EU continues to stand with the country despite the current crisis. On that day, Ursula von der Leyen published seven tweets on the day of the invasion, which generated a total of 17,408 retweets from followers in their social groups.

Also on the same day, Jens Stoltenberg strongly condemned Russia's unprovoked invasion of Ukraine and spoke with leaders of the G7, Netherlands, Finland, Sweden, Poland, and the EU as NATO leaders prepared to meet to discuss their next steps in response. Stoltenberg emphasized the importance of united action in defense of democracy and freedom and in solidarity with the Ukrainian people and all NATO member countries. He published eight communications on Twitter on the day of the invasion, generating 5281 redistributions of followers in their social groups.

At the same time, Volodymyr Zelensky called on Ukrainian citizens to be allies in defense of their country on invasion day by calling for weapons to be provided to those who want them, lifting sanctions from citizens who were willing to defend their country, severing diplomatic relations with Russia, and demanding tough sanctions from the EU. On that day, President Ukrainian had four English communications on Twitter, with his messages being redistributed 35397 times by his pages.

5. CONCLUSION

In conclusion, our comprehensive comparative analysis of the evolution of online communication strategies, direction, and communication style among Joe Biden, Ursula von der Leyen, Jens Stoltenberg, and Volodymyr Zelensky offers profound insights into the intricate world of political communication in the digital age. By examining the unique approaches employed by these leaders, we can better understand the interplay between social media and global politics and inform future research on political communication.

Firstly, our analysis reveals that each leader employs unique strategies tailored to their roles, responsibilities, and the ongoing geopolitical situation. Joe Biden, as the President of the United States, has a broader range of responsibilities and concerns, which is reflected in his more varied communication focus on Twitter. In contrast, Ursula von der Leyen, Jens Stoltenberg, and Volodymyr Zelensky have a higher percentage of posts mentioning "Ukraine," indicating that their communication strategies are more directly tied to the ongoing conflict in the region.

This finding underscores the importance of understanding the specific contexts in which political leaders operate and the ways in which their communication strategies must adapt to address the unique challenges they face. It also highlights the increasing importance of social media as a means of conveying nuanced messages that can resonate with diverse audiences and influence global discourse.

Secondly, our analysis shows that all four leaders tend to use positive language in their online communications, particularly during crisis situations. This suggests a shared belief in the power of optimism and trust to reassure their respective audiences and boost morale during uncertain times. The consistent use of positive language across

these leaders' communications also highlights the importance of emotional appeal in political messaging, as it can foster a sense of unity and solidarity among constituents.

The use of positive language during crisis situations further emphasizes the need for political leaders to be aware of the emotional impact of their messages. By employing a communication style that emphasizes hope and resilience, these leaders can inspire confidence in their constituents and encourage them to persevere through difficult times.

Thirdly, we find that Joe Biden has the highest indicator of decentralization of communication, demonstrated by the significantly larger number of retweets his posts receive compared to the other leaders. This higher level of decentralization enables him to reach a broader audience and engage with a diverse base of followers, thus giving him greater control over the dialogue and improving communication with his supporters.

This finding highlights the critical role of decentralization in modern political communication. By leveraging the power of social media to disseminate messages to a wide audience, political leaders can foster a more inclusive and democratic form of communication that encourages dialogue and promotes transparency.

Moreover, our analysis reveals that the communication activity of the four leaders increased during the initial stage of the Russian invasion in Ukraine, declined in the following months, and surged again from September to December 2022. This trend may be attributed to the ongoing conflict, the leaders' efforts to bolster international support, and a rise in diplomatic activity to negotiate a resolution to the crisis. As such, the timing of social media engagement is a crucial component of their communication strategies.

This finding emphasizes the need for political leaders to be strategic in their use of social media, particularly during times of crisis. By carefully timing their posts and engagement, leaders can ensure that their messages have maximum impact and contribute to shaping public opinion on key issues.

In addition to the timing of social media engagement, our analysis also demonstrates the importance of retweeting as a means of amplifying a message or conversation. By retweeting, audience members can indicate their agreement or approval with a post, lend legitimacy to a particular idea or opinion, and foster further interaction across the network. The high number of retweets received by each leader on key dates, such as the Russian invasion of Ukraine, underscores the effectiveness of their communication strategies in engaging their respective audiences and shaping public perception.

The high number of retweets on key dates also indicates the leaders' ability to tap into the collective consciousness of their followers and resonate with their emotions and sentiments. This finding underscores the importance of understanding the dynamics of social media networks and the ways in which messages can spread and gain traction within these complex systems.

Furthermore, our analysis highlights the significance of crafting messages that resonate with specific target audiences. Each leader focuses their discourse on specific keywords that reflect their unique priorities and concerns, although there is a common thread of collaboration and solidarity among them. This demonstrates the importance of tailoring messages to address the needs and concerns of specific constituencies, while also promoting a sense of unity and shared purpose among followers.

By examining the specific keywords used by these leaders, we can gain insight into the issues that matter most to their followers and the ways in which they seek to address these concerns through their online communications. This knowledge can, in turn, inform future research on the relationship between language, politics, and social media engagement.

Additionally, our analysis reveals that the average length of Twitter posts varies among the leaders, with Volodymyr Zelensky having the longest posts and Joe Biden having the shortest. While short and concise posts are essential for reaching and engaging with a large audience, longer posts can be more appropriate during a crisis, as they provide detailed information and arguments to achieve communication objectives.

This finding highlights the importance of adapting communication styles to suit the specific needs of different situations and audiences. By understanding the optimal length and format for messages, political leaders can maximize the effectiveness of their communication strategies and ensure that their messages are both accessible and informative.

Considering these findings, it is evident that the four world leaders employ distinct communication styles and directions, yet share common goals of fostering collaboration, trust, and understanding among their audiences. They each recognize the power of positive language in crisis situations and understand the importance of decentralization in reaching and engaging with a diverse audience.

By analyzing their communication strategies, we gain valuable insight into the ways these leaders navigate complex political landscapes and how their unique approaches contribute to shaping global discourse. This analysis also offers a deeper understanding of the role of social media in modern political communication and the ways in which it can be used to build bridges between leaders and their constituents, as well as among diverse populations around the world.

In conclusion, our comparative analysis of the evolution of online communication strategies, direction, and communication style among Joe Biden, Ursula von der Leyen, Jens Stoltenberg, and Volodymyr Zelensky provides a comprehensive understanding of the intricate world of political communication in the digital age. By examining their unique approaches and the ways in which they adapt to the specific needs of their audiences and the geopolitical context, we can better understand the interplay between social media and global politics.

This knowledge can, in turn, inform future research on political communication, as well as the evolving role of social media in shaping global discourse and fostering collaboration, trust, and understanding among diverse audiences. As the world continues to grapple with complex political, social, and environmental challenges, the insights gained from this analysis can help guide leaders in their efforts to communicate effectively and engage with their constituents in meaningful and impactful ways.

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