



A Mixed Approach for Aggressive Political Discourse Analysis on Twitter

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Abstract

Political tensions have grown throughout Europe since the beginning of the new century. The consecutive crises led to the rise of different social movements in several countries, in which the political *status quo* changed. These changes included an increment of the different tensions underlying politics, as has been reported after many other political and economical crises during the twentieth century. This article proposes the study of the political discourse, and its underlying tension, during Madrid's elections (Spain) in May 2021 by using a *mixed approach*. To demonstrate if an aggressive tone is used during the campaign, a mixed methodology approach is applied: *quantitative* computational techniques, related to natural language processing, are used to conduct a first general analysis of the information screened; then, these methods are used for detecting specific trends that can be later filtered and analyzed using a *qualitative* approach (content analysis), which is also conducted to extract insights about the information found. The main outcomes of this study show that the electoral campaign is not as negative as perceived by the citizens and that there was no relationship between the tone of the discourse and its dissemination. The analysis confirms that the most ideologically extreme parties tend to have a more aggressive language than the moderate ones. The content analysis carried out using our methodology showed that Twitter is used as a sentiment thermometer more than as a way of communicating concrete politics.

Keywords Natural language processing · Sentiment analysis · Content analysis · Aggressive discourse · Mixed methods · Twitter

Introduction

The 2008 financial crisis represented a turning point in the European way of life. The austerity-based politics fuelled the growth of political tensions occurring over the previous decade. One of the results has been the emergence, or popularisation, of a new set of political actors with discourses focused on destabilising the political establishment [1].

Spain, despite being one of the five main EU economies, was particularly affected by this economic crisis. The high rate of unemployment (from 12 to nearly 24%) with youth unemployment rates that exceeded 50%, together with the increased poverty, inequality, and the precariousness of the economy, led to an increase in citizen dissatisfaction that translated into the appearance of the 15-M movement in 2011 [2, 3]. This movement, created as an aggregation of different initiatives, gathered deep civic support, and it was considered the starting point from which new political parties (in this case, *Podemos* and *Ciudadanos*) were born.

The progressive inclusion of these new political options destabilised the traditional two-party system. Until then, the left-wing *Partido Socialista Obrero Español* (PSOE) and right-wing *Partido Popular* (PP) ruled in turns. This led to a more complex multi-party system, which increased the political instability of the country [4]. The inclusion of *VOX* and *Más Madrid* in the national courts a few years later was just another step in this direction. This instability

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can be perceived in different indicators, but one of the most important is the language that political parties use. These discourses, used by every party to refer to the others, led the population to a perceived feeling of increased aggressiveness. In fact, as can be seen in the different polls conducted by the Spanish Sociological Research Centre (*Centro de Investigaciones Sociológicas*, CIS¹), the perception that the different politics are contributing to increasing this tension has grown recently [5–7].

While these polls are useful to quickly measure the perception of the citizenship about these and other topics, there is an obvious limitation: it is based on the subjective perception of citizens and, therefore, is not useful to objectively measure the real tension underlying the political context. To overcome this limitation, different tools and techniques come from several areas such as statistics, mathematics, or computer science, which have been previously used for political analysis. These and other related techniques are implemented to help measure this tension directly from the behaviour of the different actors from the political parties. This would allow the answer to questions such as how much tension is generated, if it leads to more visibility to the party, or which parties contribute more to that tension. The advantage of the use of these techniques is that the analysis is directly based on the behaviour of the actors involved, instead of just external perceptions. Additionally, the research is conducted over all the data obtained, and not only using a sample of data.

Additionally, the use of a *mixed approach* adds a comprehensive layer to understand the underlying political tensions. Therefore, through *quantitative* computational techniques, a first general analysis of the information screened is conducted; then, these methods are used for detecting specific trends that can be later filtered and analyzed using a *qualitative* approach (content analysis), which is also conducted to extract insights about the information found. This mixed approach, based on a quantitative-qualitative analysis, is applied over a sample of tweets obtained from candidates in the Autonomous Community of Madrid (*Comunidad Autónoma de Madrid*, CAM) elections of May 2021, with the objective of analyzing how every party contributes to the hypothetical tension perceived by the citizens. The main contributions of the article can be summarized as follows:

- A systematic mixed methodology, which objectively structures and divides the content for its later qualitative interpretation, increasing the reproducibility of the outcomes.

- A general picture of the discourses that each political party disseminates through Twitter during the electoral campaign in Madrid in May 2021, and their underlying tensions and sentiment.
- A comparison of data obtained through computational techniques with the polls conducted by the CIS to check if the perception of the citizens is supported by the empirical data.

The paper is structured as follows: the “**Background**” section presents a summary of the political context in Spain, mentioning the parties that will be analysed in the article. Previous articles using computational techniques to analyse political events are also presented in this section. The “**Methodology and Data**” section presents both the sample and the methodology that the article will follow, explaining which natural language processing (NLP) techniques are used and why, and how this allows the obtention of insights for the qualitative analysis. The “**Quantitative Outcomes**” section presents the first outcomes, obtained through the application of the computational techniques, while the “**Qualitative Outcomes**” section deals with the analysis of the trends filtered from the first quantitative analysis. The “**Discussion**” section presents a critical analysis of the outcomes obtained, together with the comparison with the information found in the CIS polls. Finally, the “**Conclusion**” section presents the highlights of the article’s outcomes.

Background

Madrid’s 2021 Elections and the Political Confrontation

The CAM is a relative exception to the change of the classic two-party system that took place in the 2010’s decade in Spain. Until 2019, and during the last two decades, PP ruled with the absolute majority in the regional parliament. In 2019, the disaffection produced from the massive corruption scandals, which was able to overthrow PP’s national government in 2018, led to one of the largest vote decreases in the party’s story, both nationally and locally. Consequently, in 2019, while PSOE was the most voted political party, the left block was not able to reach the vote threshold to take control of the regional parliament. Therefore, for the first time in the century, PP, needing other parties’ support to rule the region, constituted a right-wing coalition government with Ciudadanos and the support of the far-right party VOX. With this political geometry, Madrid became one of the most right-wing governments all around the country, as opposed to the central government, composed of a coalition of PSOE, Podemos, and the support of nationalist parties from Basque Country and Catalonia. The confrontation of

¹ CIS (Centro de Investigaciones Sociológicas), Spanish Sociological Research Centre: <https://www.cis.es/cis/opencms/EN/index.html>



Fig. 1 Ideological citizens' perception of the political parties. 1 refers to extreme left ideologies, and 10 corresponds to far-right ideologies. Extracted from the CIS [9], study no. 3371, in March 2021

both governments, maximized by the pandemic situation and its management, led to a climate of tension where the government of Madrid tends to concentrate the opposition to the central government [8].

The variety of political parties that contributed to the end of the two-party system in this region and the similarities and confrontations among them can be depicted through the results from the CIS study no. 3371 in March 2021, close to the elections (see Fig. 1). In this survey, respondents were asked to give a number to each political party on a scale from the left to the right, delimited by the numbers 1 and 10, respectively. As a result, on the one hand, Podemos (1.8) was perceived more on the left than the rest, followed by Más Madrid (2.6) and PSOE (3.8); on the other hand, VOX (9.2) was seen as the most oriented candidature to the right, followed by PP (7.8), being Ciudadanos' score (5.8) in a more right-centred position².

In this context, the CIS started in 2018 to include a battery of six items in its opinion polls to ask the citizens about their perception of the political confrontation. Until Madrid's regional elections, this battery was included three times in the CIS main poll: in October 2018 [5], study no. 3226; in February 2020 [6], study no. 3273; and with two items in another methodological survey, only for Madrid, in May 2021, during the pre-campaign [7], study no. 3322]. A brief summary of these items shows how people perceived the political situation regarding this issue:

- In October 2018, 90.75% believed that there was 'a lot' or 'quite a lot' political confrontation; in February 2020, this percentage slightly decreased to 88.06% to later increase up to 94% in May 2021 (see Table 1).
- Regarding 'who is contributing to confrontation', around half of the sample pointed to politicians and political parties: 48.25% in October 2018 and 52.99% in February 2020 (see Table 2).
- Specifically asked about which political parties/politicians caused this tension, it is interesting to highlight

the evolution: in October 2018 the main contributors to the confrontation were PP and the 'independent parties' (13.75% each one), followed by 'all equally' option (9%) with VOX having 0% and Podemos 4.75%; in February 2020 VOX was already the most selected option with 15.67%, followed by 'all equally' (10.45%) and PSOE (8.71%); finally, in May 2021 VOX holds the first place with 41.4%, followed by Podemos with 36.5% (an increase of 32.02 points) (see Fig. 2).

- Unsurprisingly, the candidates of these parties were perceived as the main contributors to the confrontation, being Pablo Iglesias from Podemos the main responsible with 39.8%, followed by Rocío Monasterio from VOX with 31.9% and Isabel Díaz Ayuso with 11.7% (see Table 3).³
- Finally, in October 2018 [5] and February 2020 [6] around 84% believed that 'something should be done to reduce the political confrontation'. A slightly similar rate, 77.25% in October 2018 and 75.87% in February 2020, affirmed to worry 'a lot' or 'quite a lot' about this situation.

Discourse and Online Social Media Platforms

Online social platforms (OSPs) are widely used by political parties and social movements to disseminate their initiatives and communicate with users using more informal channels [10]. This role of OSPs as media agents in public communication, with a different logic from those of the traditional mass media, created a new hybrid-media system where both logics co-exist (traditional media and OSPs) [11]. Twitter plays a major role, as the most active and influential users are journalists, political actors, and their partisans [12]. Moreover, it is assumed that this hybrid-media system becomes more relevant during electoral campaigns [10] because there is a relationship between salient topics on Twitter, the attention that classic media pays to those topics [13, 14] and the fact that users tend to group

² To avoid sorting these parties arbitrarily, this paper will structure the outcomes regarding each of them according to their established order in this survey, from left to right.

³ The association of the candidates' names mentioned in the sections of this article with their political party can be found in Table 3.

Table 1 Perceived level of political confrontation

	Oct 18 (%)	Feb 20 (%)	May 21 (%)
A lot	60.75	47.26	72.4
Quite a lot	30.00	40.80	21.6
Others	0.00	10.20	4.1
N/A	1.75	1.74	1.8

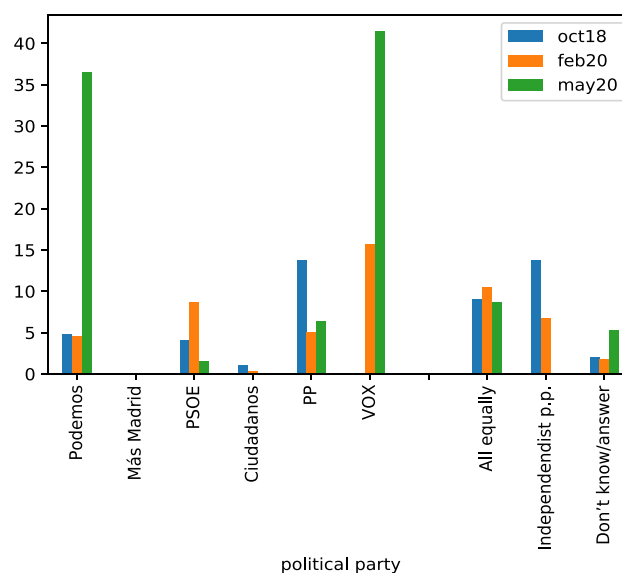
themselves following their political preferences [15]. Twitter, then, is a relevant platform in the public agenda setting [16], and the type of information that politicians post during electoral campaigns is carefully selected to shape their opinions and attitudes [17].

The tone that politicians use on Twitter to spread messages has attracted special interest as a way to shape public opinion. Specifically, the relevance and effectiveness of negativity in campaigns, where it is usually assumed that ‘going negative’ is a good campaign strategy as classic media prefer this kind of content [18, 19]. Research in the USA showed that negative campaigns have increased over time and a combination of a negative [20] and ‘amateurish’ [21] style drove Trump to victory and, at the same time, increased confrontation and polarization in the society [22]. However, recent articles applying sentiment analysis [23–25], techniques showed that Trump’s tweets had a moderate to positive tone during the electoral campaign and the pandemic situation [26]. Moreover, this negative tone in campaigns was not successful in other countries [27], and other factors, such as the presence or absence of extreme candidates or outsiders with their discourses, play a major role in the general tone of the campaign [28]. Despite these outcomes, there seems to be a consensus regarding the progressive negativity of the tone of politicians in OSPs, which has repercussions in the hybrid-media system, leading to a subsequent perception of confrontation and polarization. In this line, Gerstlé and Nai [27] differentiate in the literature three complementary dimensions that frame electoral campaigns:

1. A first dimension focuses on the *negative tone*, based on two topics: personal and program related. This option is seen as a ‘two-edged sword’ that can foster partisan engagement. Personal attacks on other politicians proved

Table 2 Percentage of main agents contributing to the confrontation

Answer	Oct 18 (%)	Feb 20 (%)
Politicians and political parties	48.25	52.99
Mass media/journalists	14.75	7.21
All of them equally	22	24.63
Others	4.25	1.74
N/A	1.5	1.49

**Fig. 2** Percentage of main political parties contributing to confrontation

to be more effective than focusing on programmatic topics, but they are riskier because the public tends to refuse these strategies, leading to partisan demobilization.

2. A second dimension, related to a set of *basic emotions* (hope/enthusiasm and fear/anxiety), used by politicians, that has been proved to be useful when framed in wider narratives, especially in engaging enthusiastic citizens with previous partisan beliefs according to those frames.
3. The third dimension is related to *populism*, not as a strong ideology but more as a rhetoric and communication frame that appeals to, and identifies people with, two main elements: first, an anti-elitism discourse that appeals to historical imagery, like ‘the nation’ or ‘decent people’; second, the use of simple and informal narratives that focus on the public institutions like ‘the system’

Table 3 Percentage of main political leaders contributing to confrontation

pol-leader	Apr 20 (%)
Pablo Iglesias (Podemos)	39.8
Rocío Monasterio (VOX)	31.9
Isabel Díaz Ayuso (PP)	11.7
N/A	6.5
All of them	5.0
Others	3.9
Ángel Gabilondo(PSOE)	0.7
Edmundo Bal (Ciudadanos)	0.2
Mónica García (Más Madrid)	0.2

or ‘the establishment’ that jeopardize experts’ knowledge as opposed to ‘the common people’ issues. This populist rhetoric is expressed as a ‘thin ideology’ [29] that ultimately presents society as divided between ‘us’ (the ‘good people’) and the ‘them’ (‘the enemy’).

Tone, emotions, and the presence or absence of populist rhetoric are, then, interrelated strategies inserted in wider narratives and supported by frames. It is worth noticing that most of the literature analyzing the tone focuses on electoral results with the aim of building models, and not on the frames that politicians create and foster to catch their audience.

According to Goffman [30], the concept of frame indicates a structure used by actors to interpret reality. Therefore, frame analysis is the identification of those elements that organize the experience of reality. While frames are not usually clear, they usually involve the use of rhetoric, persuasion, and the promotion of certain themes and strategies that are not straightforward [31]. Neither are static, as they change over time when are perceived as not appropriate to the goals that actors pursue. In politics, creating frames requires repeating key phrases, using the same vocabulary and maintaining tone and sentiment in their discourse that allows political leaders the creation of a consistent context for setting topic priorities and partisan interpretation of facts [27]. To survive and compete in this arena, politicians and political parties need to build conscious and well-organized discourses using primarily language [32, 33] ‘to influence in any way any of the other participants’ [34, p. 15].

This is why frame analysis has proved to be a flexible and powerful analytical tool to build taxonomies [35]. Using this approach can help analyse how different actors build their narratives from social movements [36]; for example, how Trump’s communication style was successful when the analysts did not consider it seriously [37]. In the case of Twitter (as an OSP), the political frames underlying the discourses can be analyzed through three different perspectives: based on the content (qualitative), based on the features (quantitative), or based on a mixed approach.

Computational and Qualitative Analysis: A Mixed Approach for Discourse Analysis

Natural language processing (NLP) is a set of techniques used with increasing success to analyse a wide range of communicational facets [38]. Sentiment and affective analyses [39] have achieved remarkable results in different fields and topics: from e-health [40] and opinion mining in medicine [41], to the vaccination rhythm in the UK using social media information [42].

In the political context, NLP is applied with a large variety of objectives: predicting electoral outcomes or interests [43–45], identifying political polarization [46], analysing political narratives and framing [47], analysing extremism [48], detecting misinformation [49, 50] or COVID related narratives [51, 52]. However, despite being considered a robust field and widely used, as Vilarés and Alonso [53] pointed out, there are controversies regarding the prediction and explainability capacity of this kind of computational analysis, as it relies only on quantitative data processing and training [54]. In this line, as Wang pointed out, ‘the incorporation of qualitative analyses, such as discourse and/or narrative analysis might provide a further understanding of the tweet’s meanings, the act of framing, and of the intentions of the political leaders’ [55, p. 8].

However, a purely qualitative analysis also presents at least two limitations. First, the holistic approach of reading all the corpus and manually coding messages to achieve meaning and interpretation is not affordable when dealing with a large amount of data [56]. And second, manually coding usually necessary implies a subjective judgement that can make almost impossible the replicability of data processing and outcomes [57].

Overcoming this problem and dealing with a large amount of data require the use of a mixed-methods approach, in which quantitative computational tools and qualitative discourse analyses are used to get a better insight [58]. Here, different methods are used depending on their strengths to test the hypothesis and questions to be studied where the empirical endpoint is a ‘reflexive montage that connects different parts to the whole’ [59, p. 75]. While this strategy is not new [60–62], it has become a useful approach when analyzing the unstructured data that can be gathered from OSPs [63]. Some research makes use of different Twitter metrics (re-tweets and re-tweet rate, number of hashtags, mentions, replies, followers) to filter the information [64, 65]. Others make use of different topic or sentiment analysis techniques to cluster qualitative data [66–69] and ultimately present the information for visualization and exploration.

Although it is assumed that this approach should be taken as exploratory [67, 70], little research can be found that analyses concrete tweets after processing big corpora of information, one of the important and pending topics in this area [54, 63, 66, 71–73].

In this article, the hypothesis and topics to be covered go in line with the computational social science approach defined by Shah et al. [74], characterized by the use of big, complex, and hybrid datasets that involve social and digital data sources, the use of computational solutions to detect patterns and make inferences from the data (mostly based on sentiment analysis, due to its flexibility to contribute to politically related areas [75]), and, finally, a methodological application capable of producing theory from different disciplines. Our

protocol of analysis, although different, follows the characteristics proposed by Elayan et al. [76], Lindgren [63], and Zamith and Lewis [58], whereas (1) the computational tools are the state of the art and have shown enough reliability, reducing the need to assess manual coding and/or intercoder reliability; (2) they are consistent all over the corpus, avoiding sampling and coding fatigue; (3) are exponentially faster and; (4) remove the risk of data-entry errors.

For this reason, this article presents a mixed-methods approach, described in depth in the methodological section, which allows researchers to analyse the discourses handled by all the CAM election candidates for 3 months on Twitter. Thus, in the first steps, the researchers rely on VADER (Valence Aware Dictionary and sEntiment Reasoner) to analyse the general tone of the tweets. Specifically trained and designed for social media content [77], with VADER there is no need to tag a new sample and train a new model. Consequently, it is a fast and reliable tool to make the quantitative analysis and, through this, then perform the qualitative content analysis.

In the second place, n-gram analysis is used to find emerging patterns in the tweets divided by tone, as this technique provides more nuanced information than the mere word count [54], as common practice for reducing the qualitative corpus. Hashtag analysis is also performed, as a complement to the n-gram approach, since it functions as a semantic gather of meanings [78]. Finally, content analysis is done through the screening of tweets selected using the NLP metrics provided by the quantitative analysis [79–81].

Through this mixed approach, the article seeks to analyse:

- The *tone of the discourse*, including the number of tweets tagged as including positive or negative content.
- Which parties contribute more to the generation of the *political tension*, based on the frequency of the negative tone and the content of their tweets.
- What kind of discourse and narrative techniques are included in the tweets, with a special emphasis on *negative content*.
- The relationship between the positive/negative tone of the tweets and their *dissemination*.

Methodology and Data

This analysis allows any user to obtain an overall perception of the whole picture, in our case how aggressive was the political discourse on Twitter. First, a quantitative analysis of the tweets generated and shared by the political representatives of each candidate party is analysed through an NLP perspective, using different techniques to extract insights from them. Second, these insights will be used to conduct a qualitative analysis of discursive aspects found relevant to the objective of the article.

Table 4 Summary of the tweets extracted per party and political candidate

Political party	No. users	No. tweets	Avg. tweets per day (Std Dev)
Podemos	91	52,188	915.58 (305.83)
Más Madrid	85	39,348	690.31 (243.64)
PSOE	94	35,639	625.24 (226.44)
Ciudadanos	118	46,706	819.40 (286.78)
PP	105	45,919	805.60 (287.83)
VOX	96	33,081	580.37 (168.67)
Total	589	252,881	N/A

Description of the Sample

The analysis made in this article relies on a set of tweets written by political candidates in the CAM elections from its declaration, on March 10, 2021, to the election night on May 4, 2021. The 6 major parties were considered for the extraction, which presented 136 candidates in the elections. From these 136 candidates, those with presence on Twitter were included in the sample, recording their tweets and re-tweets in a database for their analysis. A total of 252,881 tweets (61,926 original ones, being the rest re-tweets) from 589 political candidates were extracted. Table 4 shows a descriptive summary of the set.

Protocol of Analysis

After selecting the data, the process of extracting and analysing it was conducted. This process, summarized in Fig. 3, is described in the following steps:

1. **Data extraction:** The tweets collected for the analysis were extracted from Twitter using the API Twitter. The extraction was made between the 10th of March (when Madrid's regional parliament was dissolved) and the 26th of May, 2021 (the day of the elections). The information gathered was stored in a MongoDB database.
2. **Data preprocessing:** Before further analyses, VADER's sentiment analysis tagger⁴ was applied to calculate the tone of each tweet, divided into 'positive', 'negative', and 'compound' (a summary of both of them). To do so, and only for that end, the text inside the tweets was translated from Spanish to English, using DL Translate library⁵ (based on Transformers). The reason behind this decision was that, while VADER has an in-built transla-

⁴ <https://github.com/cjhutto/vaderSentiment>

⁵ <https://pypi.org/project/dl-translate/>

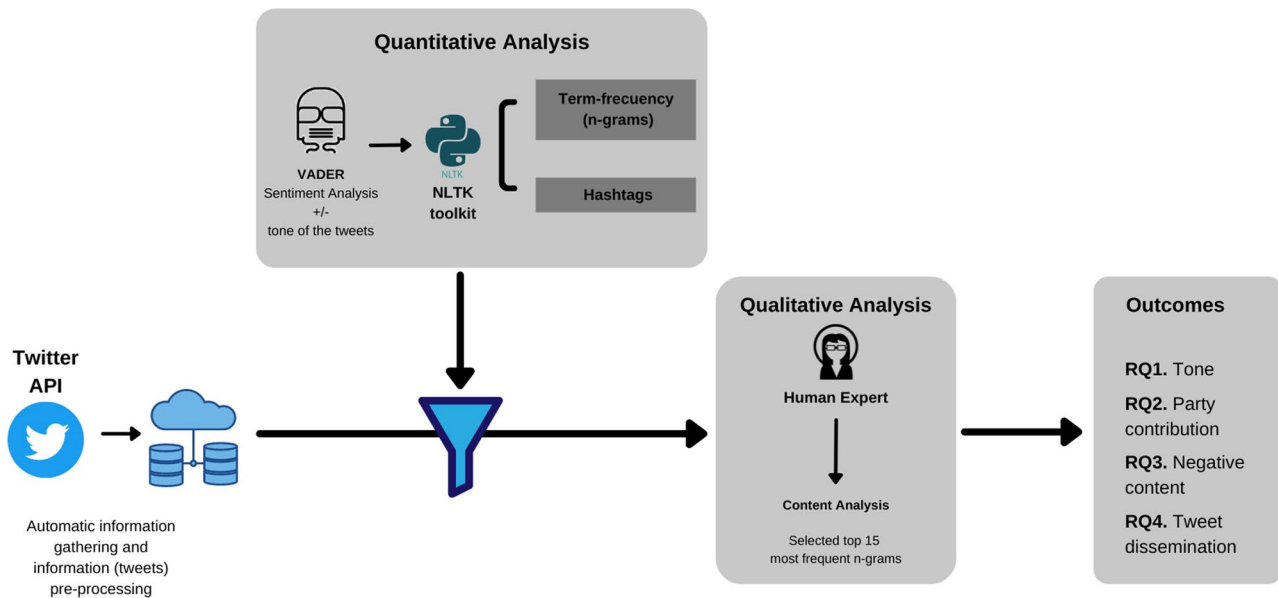


Fig. 3 Methodology summary

tion system, it is specifically designed for English, and attempts to translate VADER to other languages showed poorer results than state-of-the-art translation systems based on Transformers [82]. After obtaining the scores and recording them for each entry in the database, the rest of the analyses were conducted using the original text in Spanish.

3. **Natural language processing analysis:** The quantitative analysis of the content of the tweets was implemented using natural language processing (NLP) techniques. These techniques allow the obtention of insights from the messages, depending on the technique used. In this case, the article used the Natural Language Toolkit (NLTK) set for Python⁶, which included:

- **Sentiment analysis:** Using the previously calculated score from each tweet, the evolution of the tone of each party was calculated. Additionally, the correlation between the sentiment valence and the like/retweet account was also computed. Finally, the different mentions among the parties, together with their emotional valence, were also extracted.
- **N-gram analysis (words + hashtags):** This technique was used to calculate the most frequent terms, based on pure repetition in two different sets of tweets: those tagged as positive and those tagged as negative. Even though it is considered one of the most simple approaches in NLP [83], it was consid-

ered informative enough as the first step in a mixed-methods approach. Stopwords and punctuation were eliminated, to ensure the usefulness of this approach. It was applied to both the more frequent terms, and the most frequent hashtags inside the tweets from each party.

- **Semantic analysis:** A short analysis based on transformers was conducted over the usage of the word ‘Freedom’ and ‘Freedoms’, as they rose as relevant terms used during the campaign.
4. **Qualitative analysis procedure:** The qualitative analysis was performed by downloading all messages containing the fifteen most frequent positive and negative n-grams (unigrams, bigrams, and trigrams). After that, different tweets were selected as examples for the explanation of the discourses, based on their popularity metrics (re-tweets and likes).

Quantitative Outcomes

As the first step in the analysis of the tweets obtained, Table 4 shows that both the parties that governed during the last mandate (Ciudadanos and PP), together with the left-wing parties (Más Madrid and Podemos), were the ones that generated more tweets. Podemos was the one creating more tweets, even when having fewer candidates online than other parties, which is unsurprising considering that it is a movement mostly focused on a younger audience and, therefore, with more presence in OSP [84].

⁶ NLTK, the Natural Language Toolkit: <https://www.nltk.org/>

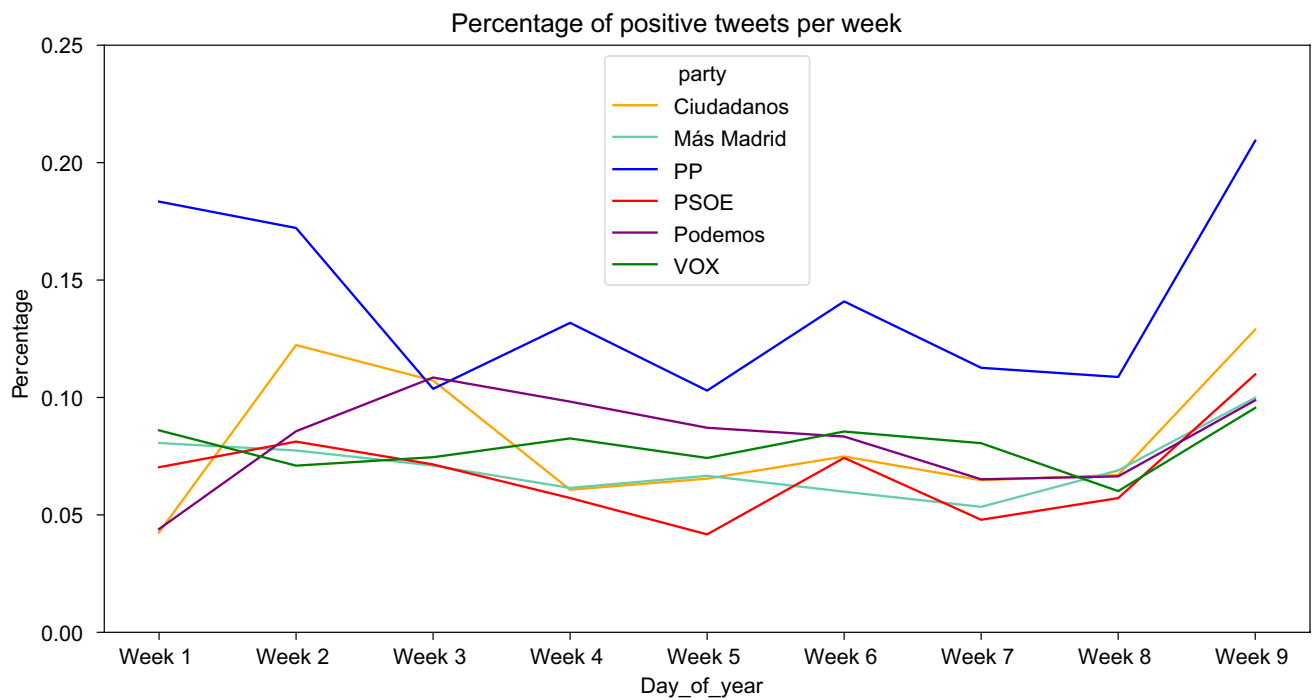


Fig. 4 Percentage of tweets showing positive content per week and per party

Sentiment Analysis of the Tweets

Following the analysis of the tweets themselves, the first step to check the research hypothesis was to divide the dataset

based on the sentiment of the tweets. As stated in the previous section, this discrimination of tweets was conducted using VADER's sentiment analysis tagger. After translating the tweets, VADER gave a score to each one depending on

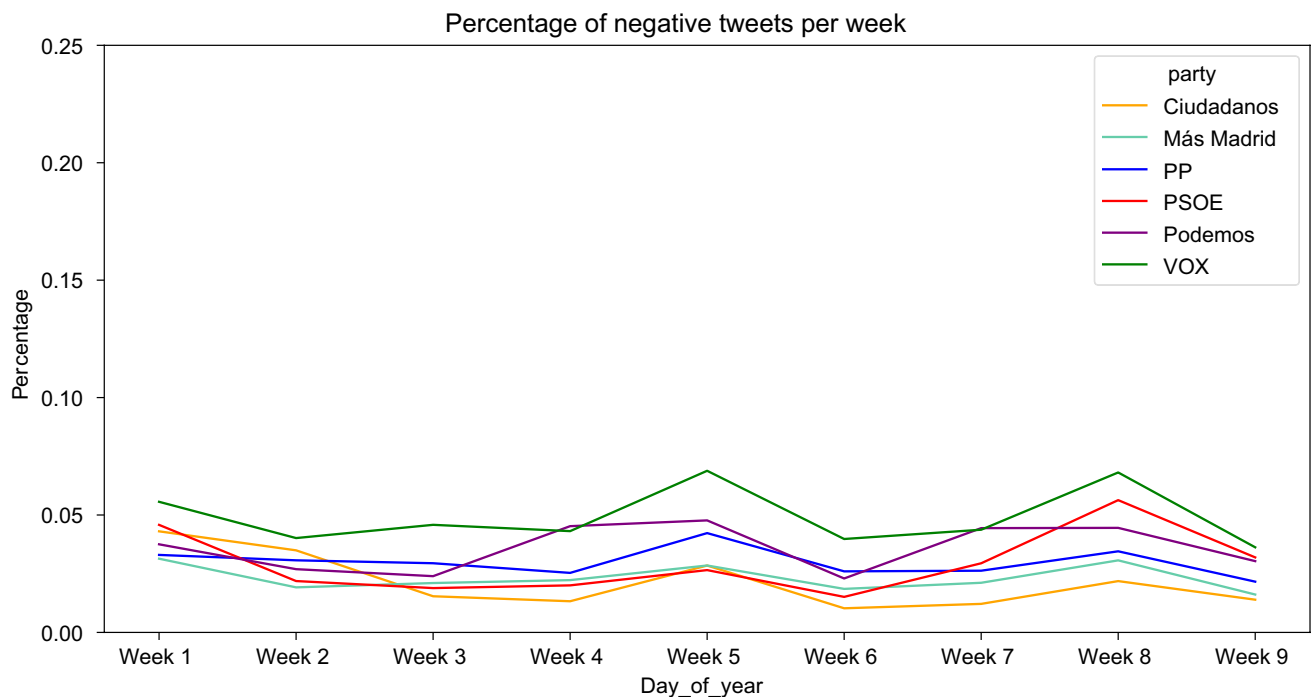


Fig. 5 Percentage of tweets showing negative content per week and per party

its content, from 0 (neutral) to 1 (high valence) on two different scales: positive and negative sentiment. The threshold established to decide when a tweet was considered positive or negative (considering the score) was 0.3. The percentage of tweets from each party that was tagged using these categories per week is represented in Figs. 4 and 5.

One interesting pattern that can be found in these figures is that there are several more tweets with positive content (around 10% and 15% on average) than with negative content (not exceeding 10% in any case). From this pattern, it can be deduced that the tone was not especially negative, being, in fact, mostly neutral and positive. The only party showing more positive tweets compared to others was PP, sometimes followed by Ciudadanos (the two parties that ruled the CAM during the last mandate). While VOX showed more negative tweets compared to the rest, this difference was not as evident as the one found in the positive tweets.

Regarding the relationship between the sentiment underlying the tweets and their dissemination (represented as the ‘Favorite count’ and the ‘Re-tweet count’ from Twitter), Pearson’s correlation was calculated. The correlation obtained for the sentiment and the favorite count was 0.015 for the positive ones and 0.044 for the negative ones (see Fig. 6). The one relating the re-tweets reached with the sentiment was -0.001 for the positive ones and 0.074 for the negative ones (see Fig. 7). As can be derived from these outcomes, there is no strong correlation between the tone of the tweet and the level of dissemination reached.

Mention Analysis

A complementary sentiment analysis was conducted by focusing on the mentions from one party to the others. In this case, two elements were considered:

- The frequency of mention from each political party to the others.

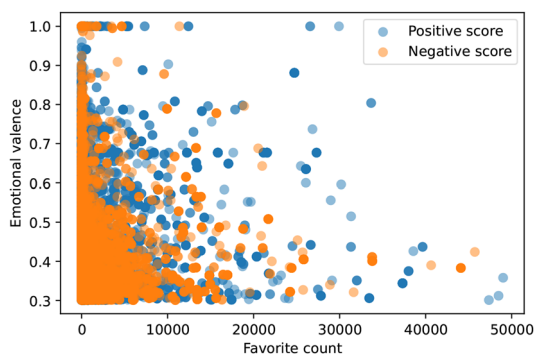


Fig. 6 Scatterplot representing the correlation between the emotional valence of the tweets and their favorite count

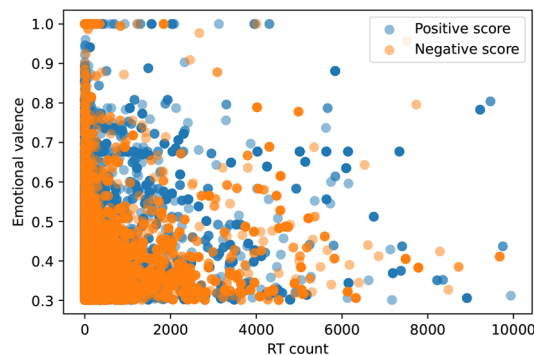


Fig. 7 Scatterplot representing the correlation between the emotional valence of the tweets and the number of times they were re-tweeted

- In line with [27], the valence score of the negative tweets mentioning other parties (considering the interest in studying aggressive discourse).

Regarding the mention frequency analysis, Fig. 8 graphically summarizes the mentions from each party to the rest of them. As can be seen, most mentions go to PP (as the leader in the polls), PSOE, and VOX. Interestingly, it can be seen that Ciudadanos and Más País receive fewer mentions than the others. Also, if we consider the parties and their ideological position, it can be observed that, except for Ciudadanos, the right-wing parties tend to mention the left-wing parties more frequently, while the left-wing parties tend to mention the right-wing ones more often.

Concerning the emotional valence of those mentions, boxplots in Fig. 9 display the negative valence of the different mentions. Those boxplots represent the distribution of negative sentiment scoring for each tweet, the median, and both quartiles (1 and 3). The parties mentioned are sorted following the ideological scale displayed in Fig. 1.

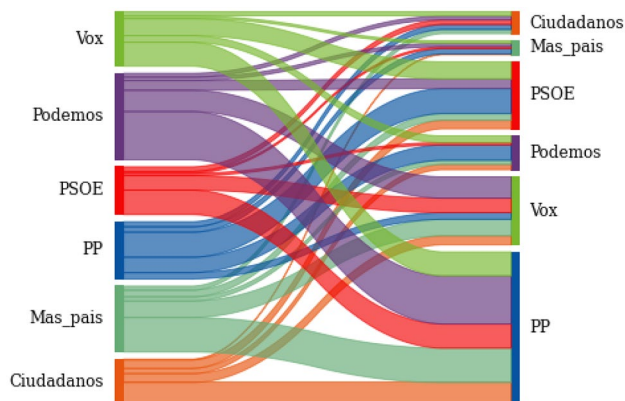


Fig. 8 Graphical representation of the frequency of mentions from one party to the others

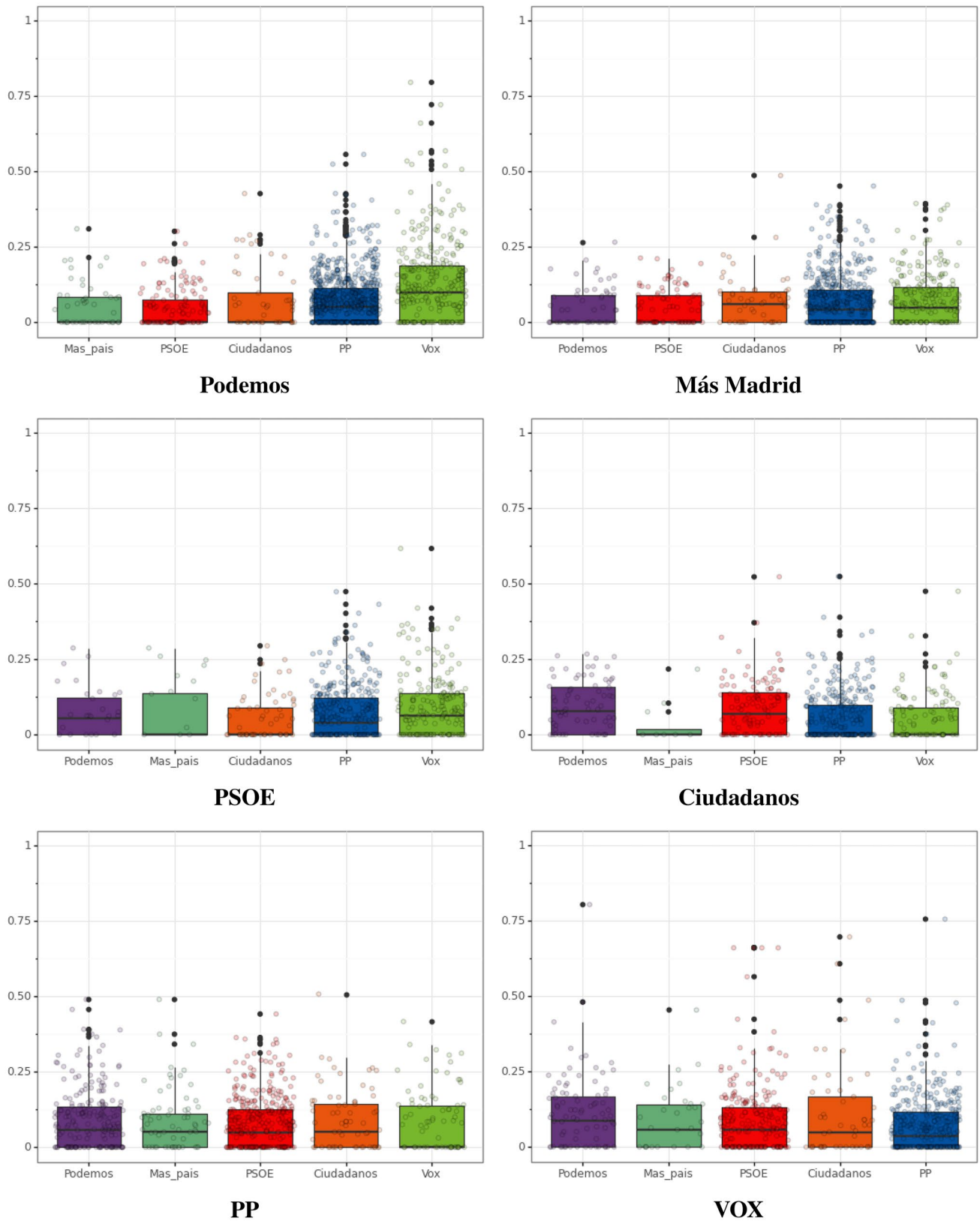


Fig. 9 Scatterplot representing the correlation between the emotional valence of the tweets and the number of times they were re-tweeted (by political party)

While all the mentions tend to have a neutral median score, it is worth noticing that most of the parties tend to be more negative when mentioning those from the opposite ideological spectrum, and more neutral when referring to parties near their ideological position (as it happened with the mentions frequency). This can be interpreted by checking that the median (Q2) differs from 0, while the third quartile (Q3) is higher than that in other examples. Podemos is especially negative when mentioning VOX and PP, same as Más País (while the latter has more neutral scores). PSOE is more negative in its mentions to Podemos, PP, and Vox, while Ciudadanos is more negative against Podemos and PSOE. PP is negative towards all the other parties, with a little less negativity against VOX. Finally, VOX is negative against everyone, but more moderate towards PP.

Term Frequency Analysis

Once the tweets were classified as positive or negative, their content was analyzed in two steps: the most mentioned terms and the most used hashtags by each party. In this step, the 15 most positive and negative unigrams (single terms, Table 5), bigrams (two terms appearing together, Table 6), and trigrams (three terms appearing together, Table 13), inside the “[Supplementary Material](#)” section from each party’s positive and negative pool of tweets were extracted. The bigram analysis provided the most comprehensive results since they include almost all of the unigrams while giving a wider picture than the trigrams. To facilitate the interpretation of the terms, only the nouns were considered for the ranking, and all the words were translated into English. The trigrams and the original list can be found in the “[Supplementary Material](#)” section.

Positive Tweets

When focusing on the positive tweets generated by the different politicians, some patterns are repeated systematically among the different parties in a very homogeneous trend.

- Most of the terms are directly related to the elections in progress, with terms such as ‘Thanks’, ‘Thanks so much’, ‘Madrid’, ‘4-M’, ‘Best candidate’, or the self-mention of the parties’ names.
- In line with the previous point, most of the parties include several mentions to their slogans or variations. For example, ‘ChooseCentre’, ‘#RuleSeriously’, ‘ProtectMadrid’, ‘#YesWeCan’ or ‘#VoteFreedom’. There are also several mentions to the main candidate’s name of the own party, such as ‘#BalEdmundo’, ‘#MonasterioR’, ‘#TeamGabilondo’, ‘#IDiazAyuso’, etc.
- There are several references to the concept of freedom by all the parties. In fact, all the parties show this word as

Table 5 Top 15 most frequent unigrams used by each political candidate sorted by party. The terms are organized by frequency, beginning with the most frequent

Party	Most frequent positive terms (unigram)	Most frequent negative terms (unigram)
Podemos	Thanks, Madrid, Win, PabloIglesias, Freedom, Podemos, Neighbourhood, YesWeCan, Day, Good, You, Best, Great, Ayuso, Go	Violence, Hate, Threats, Death, Fascist, Podemos, PabloIglesias, VOX, Iglesias, Far, Ayuso, Our, Fascist, Fascism, Madrid
Más Madrid	Mas, Madrid, Thanks, Freedom, Monica, Garcia, Ayuso, MasMadridCM, Free, MadridwithMonica, Our, Green, Be, Good, forwhatreallymatters	Hate, Ayuso, Violence, Madrid, Day, Threats, Condemn, VOX, Boys, Girls, Health, All, Politics, Mental, Ours
PSOE	Freedom, Thanks, Madrid, TeamGabilondo, PSOE, DoIt4Madrid, RuleSeriously, Today, Equality, Govern, Party, Progress, Democracy, SanchezCastejon, Our	Hate, Democracy, Violence, Threats, Threat, Condemn, TeamGabilondo, Madrid, WeDemocratsAreMore, Ayuso, Govern, Fear, Our, Serious, Fascism
Ciudadanos	Thanks, Madrid, BalEdmundo, Cs, Freedom, CiudadanosCs, Today, Work/Job, ChooseCentre, 4M, day, respect, party, madridCitizens, our	Violence, Threats, BalEdmundo, Cs, Ayuso, Condemn, Victims, Iglesias, VOX, Shame, More, Madrid, Condemn, Democracy, madridCitizens
PP	Freedom, Thanks, IDiazAyuso, Madrid, PPMadrid, VoteFreedom, Today, Spain, May, 4, Project, Communism, madridCitizens, party, populares	Sanchez, Violence, Madrid, Threats, Freedom, Govern, Spain, Victims, Condemn, Iglesias, idiazayuso, yoonayuso, Suffer, Can, Ayuso
VOX	Thanks, VOX, Madrid, Freedom, MonasterioR, ProtectMadrid, Spain, ThereIsOnlyVOX, Support, Abascal, Safety, Today, Happy, Ours, Always	VOX, Violence, Left, Madrid, Spain, Iglesias, Vallecas, Aggressions, Govern, Death, Ruin, ThereIsOnlyVOXLeft, Paul, Hate, Only

Table 6 Top 10 most frequent bigrams used by each political candidate sorted by party. The terms are organized by frequency, beginning with the most repeated

Political party	Most frequent positive bigrams	Negative bigrams
Podemos	(Good + morning); (Win + Madrid); (Madrid + YesWeCan); (Unidas + Podemos); (Neighbourhood + win); (Good + night); (Thanks + so much); (4 + May); (Yes + can); (Thanks + PabloIglesias); (Region + Madrid); (Go/Come on + win); (PabloIglesias + thanks)	(Extreme + right); (threats + death); (Pablo + Iglesias); (Right + fascist); (Fascist + can); (Can + democrats); (Terrorists + extreme); (Headquarters + Podemos); (4 + May); (Violence + Vallecás); (Provoke + violence) (Violence + gender); (Today + ultras); (Ultras + VOX); (VOX + went)
Más Madrid	(Monica + Garcia); (Garcia + G); (Mas + Madrid); (More + green); (Thanks + so much); (Green + more); (More + high); (More + fair); (Fair + more); (Final + stretch); (Best + candidate); (High + more); (More, far); (Far + more); (More, strong)	(Boys + girls); (Hate + intolerance); (Diaz + Ayuso); (Mental + health); (Monica + Garcia); (Isabel + Diaz); (Reyes + Maroto); (Politics + Hate); (Are + needed); (Extreme + right); (My + Condemn); (Violence + misogynist); (Fit + democracy); (my + repulse)
PSOE	(Thanks + so much); (PSOE + M ^a); (TeamGabilondo + PSOE); (More + free); (Jalloul + Hana); (Madrid + needs); (Freedom + equality); (More + than); (I42 + years); (M + ShangayCom); (shangaycom + lgtbpoe); (Socialism + freedom)	(Hate + speech); (Violence + gender); (Threats + death); (No + threat); (Sexist + violence); (Queues + hunger); (Absolute + condemnation); (Threat + democracy); (TeamGabilondo + WeDemocratsAreMore); (Stop + spiral); (Fear + hate); (Happened + Vallecás); (Vallecás + serious)
Ciudadanos	(Cs + Madrid); (Thanks + so much); (Best + candidate); (Madrid + Community); (Good + morning); (Great + job); (Respect + tolerance); (Thanks + your/you); (4 + May); (Strength + Madrid); (Freedom + equality); (baledmundo + thanks); (Tolerance + freedom); (Together + go/come on/we will); (Convivence + respect)	(Pablo + Iglesias); (Mud + Machinery); (Mud + Plenary session); (Plenary session + performance); (Performance + fake); (Fake + news); (Ayuso + irresponsible); (Irresponsible + liar); (Liar + Madrid citizens); (Madrid citizens + deserve); (Condemn + threats); (Aggressions + vox); (vox + vallecás); (All + violence); (violence + Condemnable)
PP	(4 + May); (Freedom + IAmWithAyuso); (Communism + freedom); (Thanks + so much); (Partido + Popular); (Socialism + freedom); (IAmWithAyuso + VoteFreedom); (Freedom + IDiazAyuso); (Project + freedom); (IDiazAyuso + PPMadrid); (idiazayuso + thanks); (Madrid + freedom); (Freedom + 4); (VoteFreedom + ImWithAyuso)	(Condemn + violence); (My + condemnation); (All + Spain); (Victims + terrorism); (Threats + representers); (Representers + public); (Public + country); (Country + Freedom); (Freedom + my); (Condemn + unspeakable); (Unqualifiable + last); (Last + acts); (Yes + Madrid)
VOX	(VOX + Madrid); (Santi + Abascal); (Thanks + so much); (4 + May); (Happy + eastern); (Macarena + Olona); (Informative + table); (ProtectMadrid + VoteSafely); (Great + Family); (VOX + Fuenlabrada); (Rocio + Monasterio); (Vote + safe); (Family + VOX); (Safety + work/job); (VOX + thanks)	(Pablo + Iglesias); (Treason + citizens); (Violence + VOX); (Illegal + delinquency); (Once + again); (All + violence); (Illegal + immigration); (Assault + communist); (Santi + Abascal); (Going + allow); (All + threats); (ProtectMadrid + VoteSafe); (Guardia + Civil); (Ruin + misery)

^aThe letter 'M' references the word 'Madrid'.



Fig. 12 PSOE wordcloud

(‘#choosecentre’) and to the name of its candidate (Edmundo Bal). The same happens with VOX and PP.

PSOE does mention some hashtags complementary to its discourse, such as ‘#paremoselgobiernodecolon’ (‘#Stopthe-ColonsGovernment’). This is a reference to a rally organized against the national government in 2019, which grouped the right-wing parties (VOX, PP, and Ciudadanos) as part of the organization. There is another reference linked to the term ‘democrats’, which is ‘#democratasfrentealmiedo’ (‘#democratsagainstfear’), as an extension of its slogan ‘#wethedemocratsaremore’ (seen on the term analysis). The same happens with Podemos, which uses the hashtag ‘#quehablelamayoria’ (‘#letthemajorityspeak’), which is a reference, again, to the people considered ‘below’ in a social scale (the majority) against the elites of society (the minority). Another hashtag in this line is ‘#ellosvanfijo’ (‘#theygoforsure’), as a mobilization call from the party.

Finally, Más Madrid’s candidates use their hashtags as a way of presenting their political program and interests. This includes references to mental health (‘#saludmental’: ‘#mentalhealth’), climate change (‘#ambicionclimaticaya’: ‘#climaticambitionnow’) or the fight against sexism (‘#lasmujeresimportan’: ‘#womenmatter’). The party’s main slogan is finally mentioned as hashtags, ‘#porloquedeverdadimporta’ (‘#forwhatreallymatters’).

Semantic Proximity

The last quantitative analysis conducted over the sample was a semantic study regarding the use of the word ‘freedom’ (‘freedom’ and ‘freedoms’), as an example key concept used during the campaign. For this reason, Transformer embeddings were created to capture the meaning of each tweet in



Fig. 13 Ciudadanos wordcloud



Fig. 14 PP wordcloud

vectors along with the context of the words inside it [85]. These types of encoding have been successful in tasks such as emotion [86] and subjectivity and polarity detection [41] and in their application on social media [87–89].

In our case, these embeddings were used for visualizations that represent their different semantic distance graphically, as can be seen in Fig. 16. Our final architecture was composed of the following: (1) Transformer-based embeddings created with **twitter-xlm-roberta-base** pre-trained model [90], and (2) Uniform Manifold Approximation and Projection to reduce the dimensionality of these encodings for the 2D visualization without losing the information of the global structure of the features [91]. This results in a plot that maps the sample of tweets according to their cosine distance, and those close to each other will have related semantics.

The image shows that, although the dots are scattered over the distribution (meaning that the word appears in a variety of semantic contexts), those who are not blue tend to be concentrated on one side of the distribution (right side), whereas the blue ones are more spread and cover a huge amount of the left side of the distribution. This can be interpreted as a different semantic usage of this word, with all the parties sharing a relatively similar pattern and the PP (represented as blue) using it in different semantic contexts. Considering that this word (with its plural) is critical for the outcomes, this representation shows which parties are using it differently.

Qualitative Outcomes

The qualitative analysis of the topics covered by the parties, merging the quantitative outcomes with an in-depth analysis of the tweets, can help the researcher present a more



Fig. 15 VOX wordcloud

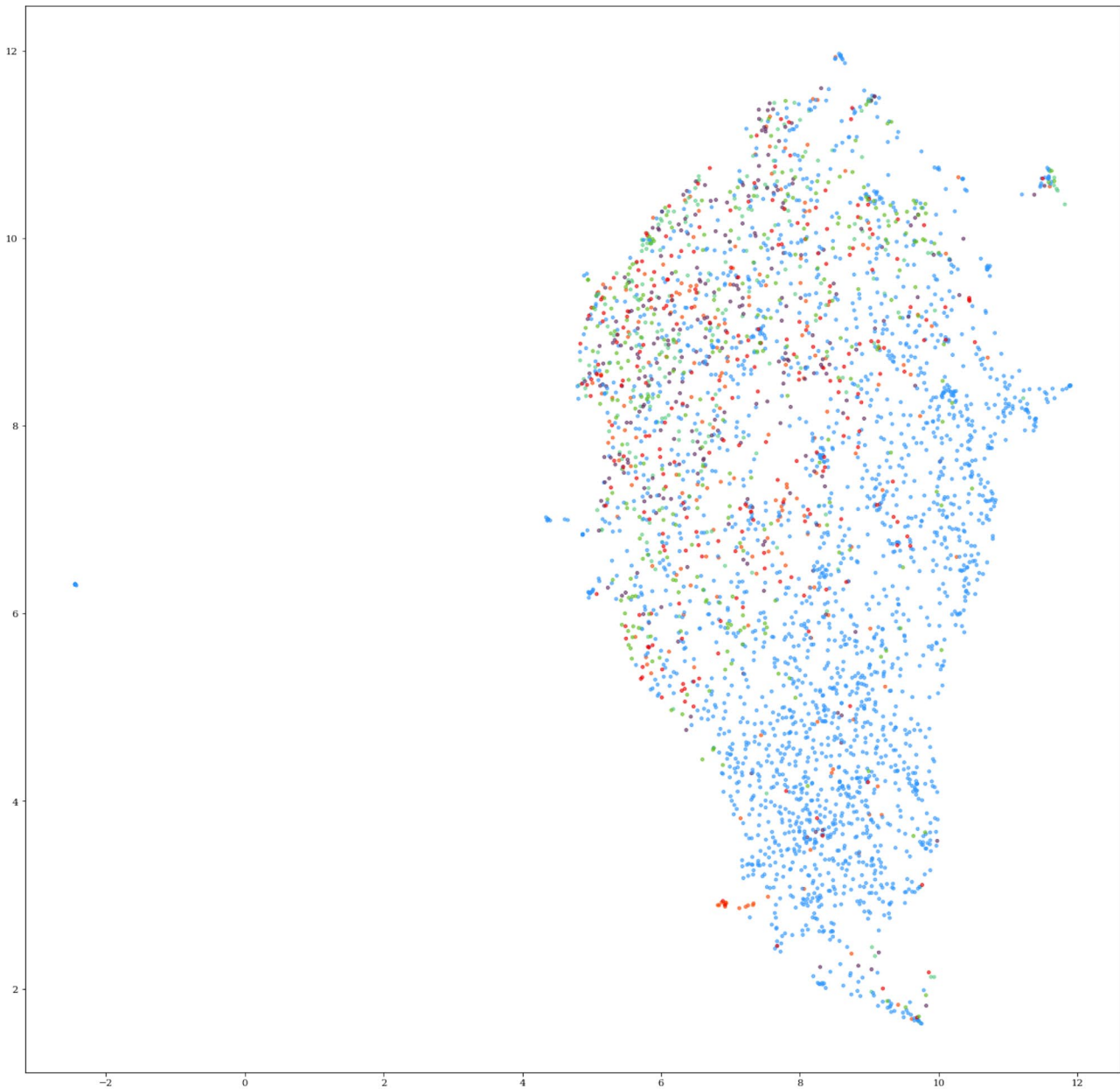


Fig. 16 Semantic distribution of the freedom word usage

exhaustive picture of the frames used. This section deals with the analysis of different tweets that include the most repeated terms analyzed in the previous section, as a way of exploring the topics underlying them.

Podemos

Podemos makes use of different slogans during the campaign. In their hashtags, they include the slogan created for these specific elections (*'Let the majority speak'*), combined with the one that became famous after the creation of the party (*'#YesWeCan'*). The first one (see examples on Table 7)

clearly represents a way to discriminate between *'the majority'* (low class) and *'the minority'* (upper class) [Pod1].

This polarization, constantly present in the party's discourse, is based on the confrontation of two groups, quite common in populist discourses. In that discourse, Podemos identifies itself as the representative of the working class, as opposed to an upper class that rules only looking for its own benefit. This pillar of Podemos' discourse is frequently reinforced; for example, by mentioning more times the *'neighbourhood'* and by repeating the slogan with variations in combination with thin-populist frames like *'social justice'* and *'democracy'* versus the *'ultra-right'* (equivalent

Table 7 Podemos tweets selection

Internal ID	Full text
Pod1	In madrid there is a majority that doesn't want Ayuso in the government. To give hope to the left, to know that it is possible, neighbourhood by neighbourhood and town by town. to win madrid.
Pod2	While some encourage hate and violence, we move forward with the rebellious joy of those who want a future with more social justice and democracy. We have been in Vallecas, getting to know in depth the work of a solidarity warehouse promoted by the neighbourhood.
Pod3	the neighbours of Vallecas defend their neighbourhood from racism, male chauvinism, lgtbphobia, and hatred of the poor. the problem lies with those who whitewash the provocations and violence of the ultra-right. more feminism, public services and decent jobs to prevent them from spreading their hate.
Pod4	Vallecas has put on its best clothes to welcome santiago abascal. how beautiful is the neighbourhood!
Pod5	¿Communism or freedom?
Pod6	Extreme right terrorism
Pod7	The PP doesn't want to lose the votes of the fascist extreme right, they give wings to do terrorism.
Pod8	The terrorists of the fascist extreme right will not be able to defeat the democrats.
Pod9	Although the PP and its ultra allies are upset, the truth must be told. we are making a law to protect children from the violence and abuse they have suffered at the hands of repugnant church hierarchs whom the Catholic Church has protected too many times
Pod10	Polls against us, fascist extreme right-wing attacking our headquarters, the vast majority of the media against us, but we have something very big and that is the militants, registered, sympathizers pushing hard neighbourhood by neighbourhood, town by town to win Madrid.
Pod11	Ayuso might already be thinking about what to do to half- condemn the death threats of the ultra-right, which continues to escalate in violence and hate. if the majority speaks out on May 4, we will free and protect the Community of Madrid from their hate speech.

to 'far-right', 'extreme right') [**Pod2; Pod3**]. Occasionally, this confrontation went to the personal level between 'Vallecas' and VOX' national leader, Santiago Abascal [**Pod4**].

Regarding the concept of freedom, Podemos uses PP's slogan but adding question marks. This strategy can be seen as a 'mirror' framing that fosters partisan adhesion because it introduces the same dichotomy exposed by PP but expressed as an interrogative sentence to, later on, deepen in the characterization of the opposition as 'extreme', 'ultra', or 'terrorist' [**Pod5; Pod6**]. This aggressiveness with the right-wing parties worked as a 'catch-all' strategy used mainly to attack PP [**Pod7**] and VOX [**Pod8**]. For example, relating 'PP', 'ultras', and religious child abuses to highlight a national law passed by the left block [**Pod9**], a semantics with clear reminiscences to the historical 'two Spains' (the breach between the republican and the fascist divisions) exploited by Podemos several times⁸. It shall be stated that Podemos implicitly makes a difference between

PP and the far-right when speaking about the threats and violent episodes that took place during that time [**Pod11**]. With the usage of very similar semantics to VOX, the 'us' is the majority that, through Podemos, is going to be 'freed' and 'protected' from hate speech.

Finally, Podemos also applies this strategy to separate itself from the establishment and the hybrid-media system to highlight again that its real support comes from 'people from the neighbourhood' (identifying 'neighbourhood' with lower classes) [**Pod10**].

Más Madrid

Más Madrid is the only party that does not publish among its most used terms any reference to its campaign slogan ('For the things that really matter'); as has been stated, the slogan is only present as a frequent hashtag. Its messages (see examples on Table 8) tend to emphasize its candidate's name (the two most frequent bigrams and the most frequent trigram) and focus on framings using the word 'more' in conjunction with its main programmatic identity lines ('green', 'fair', 'strong'). By doing this, Más Madrid builds its self-presentation around transverse values that are usually more related to the left side of the spectrum. Frequent mentions to mental health [**MM3**], green politics [**MM4**], and economy point to thin-populist frames [**MM5**], but clearly avoid the classic rhetoric of the class struggle that Podemos exploited towards confrontations.

⁸ Although in Spain polarized positions can be traced back at least as far as the eighteenth century, here the reminiscences refer to the confrontation regarding the interpretation of the Spanish civil war that resulted in Franco's dictatorship and, mainly, the transition to democracy in 1977. On one hand, the right block sees the war as a crusade against communism, a tragedy closed during the transition to democracy, and claims to look at the future and not to the past. On the other hand, especially for Podemos, this is still an open issue due to the lack of official condemnation of the dictatorship and public recognition of its victims. These visions are still present, polarizing both historical blocks [92, 93].

Table 8 Más Madrid tweets selection

Internal ID	Full text
MM1	In madrid there is a majority that does not want ayuso in the government. to give hope to the left, to know that it is possible, neighbourhood by neighbourhood and town by town. to win madrid.
MM2	VOX lives only on provocation, hate and intolerance. its racist, sexist and lgtbiphobic discourse is an insult to millions of Madrileños and Madrileñas.
MM3	Wednesday: more psychologists are needed in the public health system.Friday: not like you, Laura, thank you very much.
MM4	The extreme right-wing comes to talk about the #marmenor and to propose one environmental nonsense after another, but all their concern for murcia and for spain fits in a slogan. to stop this #ecocide we need serious proposals, resources and that the ilp of @ilp_marmeno goes ahead.
MM5	We are losing a generation that has gone through one crisis after another. young people continue to be the age group most affected by job destruction with 40 percent unemployment. ambitious measures are needed to distribute work in order to generate employment.
MM6	Children's rights are non-negotiable. that is why i propose to the rest of the political forces a public and written commitment that the parental veto will not reach the classrooms of madrid.
MM7	it is shameful and outrageous that #monasterio pretends to make responsible to a few children of the insecurity in #madrid. They are not #menas, they are girls and boys. Such lack of humanity !!! #racism #cowardy#debatetelemadrid
MM8	Few things more vicious than Rocío Monasterio (VOX) targeting children who are alone. you have to be miserable.

Around the framing of ‘freedom’, several strategies are found. First, Más Madrid replicates Podemos’ approach by appealing to ‘hope’, neighbourhood’, and ‘town’ [MM1]. Second, instead of focusing on the concept of ‘working-class’ associated with Vallecas, Más Madrid used identity frames to show that VOX’ ‘intolerant’ discourse is an ‘insult’ to all Madrid citizens that are women, immigrants, or lgtbi+ [MM2]. This strategy avoids the separation between the two blocks found in Podemos, confronting VOX’s discourse with several identity frames that appeal to a more plural society. And third, one aspect where Más Madrid’s tone was especially hard appeared in the bigram (‘boys’ + ‘girls’), regarding the ‘freedom’ that the right-wing parties defend for the parents to choose the topics to be taught in public schools [MM6]. However, this tone was also present repudiating the identification of ‘MENAs’⁹ with insecurity and delinquency made by VOX [MM7]. Here the tone ranged from concrete propositions to clear populist confrontations and insults [MM8].

PSOE

PSOE’s slogan, ‘Do it for Madrid’, appears relatively neutral compared to the ones from other parties. Instead of following other parties’ strategies based on confrontation, PSOE tried to appear as a secure, institutional option (see examples on Table 9), highlighting also its politics during its long life (‘142’, ‘years’) [PSOE1] and its candidate’s seriousness (the candidate, Ángel Gabilondo, was the oldest one with 72 years and a well-known academic career as the

Rector of Autonomous University of Madrid) by publishing the slogan ‘#RuleSeriously’. This frame was used to attack Ayuso when she tried to buy the SputnikV vaccine for the population in Madrid, by asking if that unilateral decision is ‘democracy’ or ‘national populist authoritarianism’ [PSOE2], and also to make a veiled criticism of Ciudadanos, by stressing that ‘there is no possible equidistance’ between ‘democracy’ and ‘fascism’ [PSOE3]. Finally, the institutional focus was stressed by re-tweeting a message calling the left block to be united against any threat of violence [PSOE4].

In this line, the hashtag ‘#WeDemocratsAreMore’ was extensively used to encourage people to vote (‘freedom’, ‘go’, ‘vote’) against the ‘far’, ‘extreme’ right that ‘hate’ and are ‘violent’ [PSOE5]. Interestingly, in this call to the ‘massive’ ‘democratic’ ‘vote’, there is no mention to ‘neighbourhood’, or ‘the people from below’. Here, the call to civil mobilization is framed around classic social-democratic narratives relating ‘freedom’ with ‘equality’, and looking to ‘avoid going back to the past’, where the ‘past’ clearly refers to the Francoist dictatorship, a ‘racist, classist, sexist and homophobic’ era represented by the right block [PSOE6]. Another way to frame PP was regarding Ayuso’s statements in which she called those who went to the ‘hunger queues’ ‘dependent’ people, pointing to the ‘insensitivity towards inequality’ that Ayuso expressed [PSOE7].

Finally, another topic used as a frame to attack the right parties and to outline differences from the other left-wing alternatives is the lgtbi+ violence that happened during that time lapse. PSOE is the political option where references to these two aspects are more frequent and explicitly used to associate ‘lgtbiphobia’ with the ‘freedom and beers’ politics of Ayuso [PSOE8].

⁹ Acronym for ‘Menores No Acompañados’, or ‘Unaccompanied Minors’, immigrant minors who have no parents and adults that are responsible for them in Spain.

Table 9 PSOE selected tweets

Internal ID	Full text
PSOE1	they wanted to shut down our voice but our roots were strong and our convictions solid. we proudly built a more feminist country.supportive.diverse.fair.142 years and we continue with the same illusion, with the strength of an initials loaded with future.#psoe_142years
PSOE2	Communism or freedom? #ayuso contacts Moscow outside the legality and solidarity of the #eu and ignoring the lack of sanitary guarantees. democracy or populist national authoritarianism
PSOE3	there is no equidistance possible. either democracy or fascism. i vote for @equipogabilondo.
PSOE4	good afternoon, @monica_garcia_g @isaserras @equipogabilondo @ierrejon @sanchezcastejon and @pabloiglesias , just asking you to live up to the threat and unite to stop the far right and trumpism in madrid.atte. a left voter. #tsjm #eleccionesmadrid
PSOE5	first are words and taunts, an incessant drip capable of undermining the stones. then come the threats and aggressions. this generates the hate speech that we face in the #4m. equipogabilondo #votapsoe votes for #democracy #wethedemocratsaremore
PSOE6	we must stop them! we cannot allow madrid to become the capital of the extreme right. we do not want a return to the past, a racist, classist, sexist and homophobic madrid. it is a real danger, it exists, it is there. vote on 4m
PSOE7	Pain indignant at ayuso's statements about people who go to 'hunger queues'. maintained? it's an offense. it's a disgrace. it shows his way of conceiving society: insensitivity towards inequality. #equipogabilondo #hazloxadrid
PSOE8	Freedom and beers while they beat you up or insult you: meanwhile lgtbiphobic attacks and aggressions increase exponentially to hate speeches, diaz ayuso trivializes with human rights and problems of the lgtbi+ collective, more than 600,000 people in Madrid...#4m #votepsoe

Ciudadanos

Ciudadanos uses 'ChooseCentre' as the slogan, trying to appear as a moderate group compared to the rest, a formula that gave them good results in previous elections, especially concerning the 'extremist' positions maintained by the other parties on different topics. Thus, its bigrams and trigrams

about common liberal democratic values ('respect', 'tolerance', 'coexistence', 'equality', 'moderation') with a focus on its management efficiency and 'decency' ('great', 'job') that seeks to differentiate this option as a moderate political option (see examples on Table 10), different from PSOE's social-democratic frames [CS1]. In this case, this strategy was used to attack the national government parties on one side, and PP

Table 10 Ciudadanos selected tweets

Internal ID	Full text
CS1	Cs succeeds in getting the European Parliament to demand the investigation of the 'Caso Neurona' and the alleged corruption of Podemos. Great job, @JRBauza and the whole team!. We work for regeneration against all odds, no matter who it hurts. That's why we are so uncomfortable and necessary.
CS2	Since certain gentlemen love to put on medals for something that is not theirs... I have decided to collect the most important things (in my opinion) that @Cs_Madrid achieved in the CAM Government and thank them for their great work.
CS3	aguado reappears and charges against ayuso: 'madrid was already free before you broke the government'. 'now you tell us to choose communism or freedom. it's another thing if she wants to be free to agree with vox, colonize telemadrid or be free to be gauged'.
CS4	psoe and Podemos have rejected in the health commission the VAT reduction of all the masks to 0% Pablo iglesias months ago to a proposal of cs so that it was of 4 %: 'it is scandalous that the vat of the masks is to 21%, we want to lower it still more'
CS5	you and the ilk of journalists like you are disgusting.you make unforgivable mistakes, you defend corrupt people like in this 2014 tweet to the most mafia clan in spain, and you jump at the slightest opportunity to talk about 'fake news' you are the shame of journalism, the lament of a country.
CS6	the mud machine at full capacity.fake news.
CS7	ayuso is irresponsible and a liar. The people of Madrid do not deserve this..
CS8	we didn't came to politics to do the easy thing but to work for those who have it hardest.the people of madrid deserve a government where the centre, moderation and common sense of cs are present to prevent the extremes from directing their future. thank you for joining me today.
CS9	it can be seen that in Podemos are specialists in attacks on headquarters, because they already know who it has been: 'the extreme right'. in other words, once again, it has nothing to do with vox. we condemn this one as all the attacks that follow the same logic that they started; we are better than they are.
CS10	i condemn the threats against pablo iglesias and the aggressions against vox in vallecas. i condemn the harassment that cs has suffered in catalonia since it was born and the terrorist violence that bildu still justifies today. i am disgusted by those who dilute any totalitarian attack. democracy is not irreversible.

on the other side. In this way, Ciudadanos presents a strategy that frames them as the efficient management option that worked as a counterbalance between PP and other extremist positions [CS2].

Regarding the concept of ‘freedom’, Ciudadanos presents a harder tone, especially when emphasizing PP’s strategy behind the call to elections: to obtain a higher majority that would allow PP to govern alone or with the only support of VOX and thus leaving the centred option outside the government [CS3].

Ciudadanos’ most frequent negative bigrams and trigrams are divided into three clear frames. First, the most frequent bigram, ‘Pablo’ + ‘Iglesias’, acts as a frame to criticize Podemos’ candidate work in the central government, indirectly criticizing PSOE as well [CS4]. Second, the bigrams and trigrams mentioning ‘mud’, ‘machinery’, ‘fake news’ are exclusively aimed at describing stories disseminated by various media associated with the left and right of the political spectrum as ‘fake’ content. This strategy can be seen as a two-way game, showing its centred moderation through its good disposition to speak with everybody on all occasions but, parallelly, through its attacks on several mass media from both sides of the political spectrum [CS5; CS6]. Finally, a third frame is built around the call to elections itself through the words ‘Ayuso’, ‘irresponsible’, ‘liar’, ‘madrileños’, or ‘deserve’. They focus on the region’s situation and on its consequences, using them to attack the decision by PP’s candidate about anticipating the elections [CS7]. Again, this is a way to stress its role as a relevant option to ‘prevent the extremes from directing their [Madrid’s citizenship] future’ [CS8].

The frame regarding its ‘centred political position’ is also present in its messages regarding the different violent incidents that happened during that time [CS9]. Besides the fact that almost all parties explicitly rejected the incidents, Ciudadanos carefully used its centred narrative by stressing its condemnation of ‘all kinds of violences’, including the ‘harassment’ suffered since its political beginnings [CS10].

PP

From the beginning of the campaign and in clear contrast with the other parties, PP used its slogan ‘Freedom’ extensively and in different ways; for example, linked in a condensed way with its candidate (‘freedom’, ‘#ImWithAyuso’, ‘#VoteFreedom’) or to object to its opponent’s values (‘Communism’ vs. ‘Freedom’; ‘Socialism’ vs. ‘Freedom’). In this way, PP presented itself positively by using its slogan to confront the left-wing parties and the national government’s decisions, putting the semantic emphasis on a dichotomized election: on ‘freedom’ they defend against the ‘communism/socialism’, represented by PSOE, Podemos, and Más Madrid.

Concerning the general vocabulary used in the discourse, three sets of terms can be differentiated (see examples on Table 11). First, the most frequent bigrams and trigrams are related to the concept of ‘threats’. The most liked and retweeted message is a simple statement condemning the violence [PP1, PP2]. The difference with other groups is PP’s explicit support to VOX concerning the incidents during a rally in Vallecas, questioning the appropriation by Podemos of the neighbourhoods [PP2, PP3].

Table 11 PP selected tweets

Internal ID	Full text
PP1	Threats to public representatives make no sense in a free country. my condemnation of these recent unspeakable acts.
PP2	I condemn violence. always. wherever it comes from. whoever suffers it. i want threats out of politics. and the escraches and the whitewashing of eta’s environment. and cynicism. and cynicism. #trescantos for #freedom.#4m
PP3	All my support to vox in the face of the intolerable attacks suffered in vallecas. madrid belongs to everyone. also, at a time when the extreme left is collapsing in the neighbourhoods they thought were ‘theirs’. madrid is freedom.
PP4	‘Boys, girls and niñas may be afraid to say that they are suffering violence in their classrooms because they listen to Ayuso’. In Podemos they are unhinged
PP5	what a hypocrite pedro sanchez, visiting a salesian school in angola! while he pretends to limit the educational concerts of the salesian schools in madrid and all of spain.
PP6	Let’s have a clean campaign. Mr. Sanchez, do not come to Madrid to muddy.
PP7	They ask for your to vote to end unemployment and turn Spain into the country with the highest unemployment in Europe - they tell you they are going to help the self-employed and get more companies to close in Spain than in the whole of the United States - and then some say that the story doesn’t matter...
PP8	Psoe and Más Madrid agree on a tax increase of 3,600 million if they govern in Madrid. Podemos prepares a ‘patriotic taxation’ for Madrid, with ten new taxes. Madrid grows today ten times more than the average avoiding job destruction.on 4-m we have everything to play for...
PP9	socialism only gives you the freedom to choose your death. the choice of your education, your savings, your work or your future is made by them from the political power.

Table 12 VOX selected tweets

Internal ID	Full text
VOX1	The true defense of #freedom is this.it is urgent to lift all restrictions in the #CommunityOfMadrid and only @monasterior defends it.#freedom is more than a slogan. #ProtectMadrid #VoteSafe
VOX2	@santi_abascal 'pablo iglesias is a criminal and a pathological liar'
VOX3	@santi_abascal took Pedro Sánchez legacy to the cleaners: deaths, ruin, insecure streets, freeing of etarras, allocation of judges and insults to millions of Spaniards.
VOX4	How is it possible that @santi_abascal of vox_es has defended more deputies like idiazayuso or cayetanaat than the entire party of populares...a leader who leaves his colleagues to die at the feet of the mafia and media machinery of the left is not a leader, pablocasado...
VOX5	It is mind-boggling. the SER debate ends because monasterio has said that she condemns all violence but that she also demands that the violence that VOX has been suffering be condemned.that violence that no one on the left has condemned and that they have even supported. What a shame!. #debateser
VOX6	'VOX crossed a line and it will be the last one it crosses', president of the government. the PP is a 'criminal organization', minister of interior. those who sows winds reaps storms', general director of the civil guard. prosecutor's office, is this not a crime of initiation to violence?
VOX7	The May 4 th Madrid's neighbourhoods will once again belong to the neighbours. if vox governs, we will put an end to the squatters and the narco-flats..#ProtectMadrid#votesafe
VOX8	A self-employed person who owns a van is now a climate terrorist. a new dagger to the heart of the worker, the unemployed, the pensioner. in short, more unemployment, more misery and more ruin. we will defend ourselves from those who want to sink us.
VOX9	armed gangs shooting in madrid. the good intentions and stupidity of all the parties that have tolerated illegal immigration for years has brought us to this point. law and order must be restored, and it is clear that in order to do so. #theresonlyvoxleft.
VOX10	those who favor illegal immigration favor crime and death
VOX11	Our hispanic american brothers and sisters have suffered closely from totalitarian politics.we will not allow the left to bring the same misery and ruin to spain.#protectmadrid #votesafe

The second set involves the confrontation with other political parties. For example, regarding the issue of children's education, the inclusive language or the educational law [PP4, PP5].

Finally, the third set concerns the main confrontation that PP wants to highlight: the political conflict between them and the Spanish government. This confrontation, developed during the COVID crisis, increased after the strategy of Madrid's region of facing several restrictions ordered by the central government for as long as possible. This conflict, which started as a public health issue, was extended to other topics, such as economy, education, or employment [PP6, PP7, PP8, PP9].

VOX

The main particularity of VOX's discourses is its use of a war-discursive narrative (see examples on Table 12). This is present in several points, such as its slogan 'Protect Madrid', explained as the protection of Madrid against 'all the enemies of Spain'¹⁰ [VOX1]. This war-like narrative also works on how they deal with the issue of 'violence', 'death', and

'threats' [VOX2, VOX3]. VOX uses the mirror discourse claiming for the condemnation of 'all kinds of violences', suggesting this way that the left block should also condemn the violence that VOX suffers, including the one caused by the 'establishment' and some mass media using a straightforward and partisan vocabulary [VOX4, VOX5].

Concerning the frequent bigrams and trigrams from its discourse, almost all of the thin-populist topics can be found around the notion that traditions, family (according to its classic catholic notion) and jobs are being jeopardized and need to be protected. The unigram 'death' is repeatedly mentioned by VOX, as a reference to the policies implemented by the central government concerning the COVID crisis. In this line, this organization also uses the words 'treason', 'illegal immigration' and 'delinquency', or 'communist assault'. This is highly related to its slogan and its bellicose position during the campaign, criticized by other parties for its explicit mentions of the relationship between immigration and crime [VOX10]. More than any other political option, VOX uses the negative content to express and frame its political proposals, going against the political establishment. Its messages are especially frequent and aggressive with Pablo Iglesias [VOX5], Pedro Sánchez, and the national government [VOX6]. However, they also use this strategy to attack the national PP and the mediatic machinery.

VOX also uses extensively its slogan 'protectmadrid' to speak about classic issues in working-class neighbours like

¹⁰ This included, as stated on its web (<https://protegemadrid.es/>), social and job insecurity, a problem with unsupervised immigrant minors, the veto of fundamental rights due to the COVID pandemic and the economic policy of the central left-wing government.

violence, drug addiction, and giving political promises to working-class people and small business owners [VOX7, VOX8, VOX9]. In doing so, VOX interpellates the same target population avoiding the classic ‘class-struggle’ conflict and aligning the interest of several groups affected by the political decisions during the pandemic.

This partisan anti-establishment narrative that aligns VOX with the working classes is used as a bridge to justify another classic populist proposal that produces confrontation: illegal immigration. VOX is especially aggressive regarding insecurity, shootings between bands, drugs, and almost any other problem they associate with illegal immigration [VOX10]. But at the same time, there are several references to ‘our Hispanic American brothers’ that suffered the totalitarian communist regimes [VOX11].

Discussion

The present article has the objective of analysing the agreement between the citizens’ perception of the CAM elections and the sentiment and aggressive content of the candidates’ tweets during the campaign. This objective was approached using a hybrid approach to analyse an event (or time lapse), by providing a first overview through a quantitative analysis and combining the outcomes with a more in-depth qualitative approach. One of the main strengths of the proposed methodology was to follow a process that was as replicable as possible. This implied moving any ‘interpretative’ part of the analysis to the last possible steps of the procedure. For this reason, several state-of-the-art NLP analyses and VADER were proposed to get a set of reliable metrics that gave a first overview of the data as well as structural information about the corpus that, used in conjunction with the tweets’ metrics, guided an in-depth qualitative content analysis and made it quicker and affordable. Moreover, the outcomes agree with the literature review [53, 55] on the need to go deep into the corpus to understand the intentions, frames, and ultimately the meanings behind the concrete word analysis [55]. In fact, the content analysis provided a better comprehension of the different uses of concrete words in different framing strategies which would have been obscured by only quantitative methods.

Concerning the parties’ contribution to the political tension, several elements shall be considered here:

- Not surprisingly, the general mentions show that the ruling party, and favourite in all pools (PP), received more mentions than any other. Interestingly, this analysis also gives a broad picture of the political spectrum debate, in which each block (left vs. right) mentions more times the other block than the own one, with the exception of Ciudadanos, whose discourse was clearly against these block constructions.
- In the more nuanced approach given by the emotional valence analysis, it can be seen that, behind the general tendency to neutral messages, the political options tend to be more negative in their mentions to the opposite ideological block. This negativity is higher in the extremist options (Podemos and VOX), not only against each other, but especially in the case of VOX being highly belligerent against everyone else, with the soft exception of PP.
- The semantic analysis of one of the cornerstone words of the campaign, ‘freedom’, evidences its extensive usage by all political parties. However, PP was the party that succeeded in its use and in creating a unique semantic space to amplify its discourses. In line with the n-gram analysis and the fact that PP was the more positive political option in its messages, this graph makes clear that the use of these terms by PP represented semantic difference.
- Finally, after the content analysis, it can be inferred that the parties seen as more ‘extreme’ by the population (VOX and Podemos) not only showed more negative mentions. With a narrative more focused on populist ideas, the discourses were charged more negatively than others, both with an intention to criticize the other and with the constant comparison of that opponent with extremists. This goes in line with the findings of Haselmayer [28], who proposed that the more extreme and populist parties tend to communicate differently, adopting a more aggressive discourse than the ‘mainstream’ parties [94].

The remaining parties (PP, PSOE, Ciudadanos, and Más Madrid) did participate in the political conflict, but in a more subtle way. For example, PP generated the topic around which the rest of the parties pivoted: a dichotomization (polarization) of two ideas: the idea of freedom as an ideology and its confrontation with other political approaches (e.g. socialism). This strategy of polarizing the debate is followed not only by PP, but also by the other parties, following a populist-related narrative strategy of ‘us’ against ‘them’, no matter if talking about fascism, communism, socialism, democrats, low vs. upper class, etc. Simplifying the discourse just to two sides colliding is quite common in the extremist discourses, as a narrative technique to ‘delegitimize’ the adversary [95].

This narrative technique is not the only one related to extremism. VOX also makes use of a war discourse when talking about other political options, with references to ‘deaths, ruin, insecure streets’, ‘criminals’, ‘letting the partners die at the feet of the mafia’, or ‘communist assault’. On the other side, while Podemos did not explicitly use war terminology, in its narrative there are several mentions to the ‘two Spains’ that confront particularly with VOX and with the right parties in general.

The results of the elections show that PP clearly won with 44.76%, almost reaching the absolute majority with

66 seats, doubling the number of its voters in the previous elections in 2019. From 26 seats to zero, Ciudadanos left the regional parliament, but PP could rule alone with the support of VOX, which got thirteen seats, one more than before. Except for Más Madrid, which got four more seats than in the previous elections, the results were negative for the left block, since PSOE fell from 37 to 24 sets, and Podemos did not take advantage of its leaders' effect and only reached ten seats, three more than before¹¹.

Both quantitative and qualitative outcomes also align with Ersnt et al. [29] and Gerstlé and Nai [27] on conceiving the populist framings as thin-ideological narratives more used by extreme political parties than by the centrist options. There is also evidence that this rhetorical strategy is not exclusively applied not only by the right-wing options but also by political parties on the left side of the spectrum (Más Madrid, but especially Podemos). However, inside this common frame, VOX had clearly harder vocabulary and tone than Podemos. This could be associated, as suggested by [29] and Gerstlé and Nai [27], with the fact that Podemos is part of the national government coalition. Given that several attacks climbed to the national level and that this framing strategy is mainly used to debunk the 'elites' politics and decisions, Podemos and PSOE could not extensively use this resource without hurting themselves. This aspect may also be among the reasons why PSOE's strategy of 'going negative' in its words and contents led them to the biggest drop-out votes among all the main political parties.

Overall, these outcomes contradict the assumption that 'going negative' is a good campaign by itself, and that the overall tone in OSP alone is increasingly negative (especially considering that not only was PP the most voted option, but also the party with more positive tweets). On the contrary, this analysis supports Haselmayer et al. [19] and Haselmayer [28] assumptions that the mass media's preference for negative content may have a repercussion on the hybrid-media system and amplify the perception of the negative tone in the population. Likewise, the mass media's framing of the campaign as strategic on a national level may have had implications on the incremental negative perception by the population [96]. Indeed, the political parties made extensive use of thin-populist rhetoric on Twitter, especially using several events to frame their narratives, but controlling the tone of the specific words. If the mass media amplified those negative, soft-populist frames to the general public, this could lead to the overall perception of the increased political confrontation found in the CIS surveys.

Conclusion

The results show that this mixed-methods strategy provides enough information to thoroughly understand the general underlying trends regarding the positive and negative contents of the messages, and the structural characteristics of the frames that each political option used during the campaign.

1. According to the literature review, the sentiment analysis performed using VADER showed that electoral campaigns tend to be mostly tagged as neutral.
2. Concerning the content of the negative tweets, the two most extreme political parties (Podemos and VOX) presented a more aggressive vocabulary.
3. The scarcity of concrete programmatic proposals in tweets and the hegemonic use of different events to build frames point to communication strategies seeking to foster partisan engagement and make direct attacks on other political options.
4. By doing this, the use of Twitter resembles a 'sentiment thermometer' more than the classic conception of OSP as channels that communicate concrete political proposals and engage with society more directly.
5. Despite not being particularly negative with concrete words, the contents were especially negative and involved several thin-populist topics like immigration, the ideas of what is freedom and socialism or the 'nation', together with several anti-establishment attacks and class-struggle slogans. This can be the reason for the citizens' perception of the political tension.
6. Finally, there is a solid connection among all the actors in the system that feed back into each other to foster partisan positions and amplify each political party frame, especially using day-to-day events to express their political differences and affinities. Therefore, the amplification of this soft-populist rhetoric towards polarization and confrontation should be studied by evaluating how the contents, meanings, frames, and narratives move along the hybrid-media system to foster the perception of confrontation in citizenship.

Supplementary Material

See Table 13.

¹¹ The official results can be seen here: <https://resultados2021.comunidad.madrid/Resultados/Comunidad-Madrid/0/es>

Table 13 Top 10 most frequent trigrams used by each political candidate sorted by party. The terms are organized by frequency, beginning with the most repeated

Political Party	Most frequent Positive trigrams	Negative trigrams
Podemos	(Win + Madrid + YesWeCan); (Neighbourhood + neighbourhood + win); (Neighbourhood + neighbourhood + Madrid); (IWouldAppreciate + your + votes); (Colleagues + partners + IWouldAppreciate); (Your + votes + ThankYou); (Smile + WeAreGoing + Win); (pabloiglesias + thanks + soMuch); (Good + morning + all); (Win + Community + Madrid); (Health + Republic + always); (izquierdaunida + WeCan + thanks); (Ibelieve + aeWouldHave + awakened)	(Extreme + right + fascist); (Right + fascist + will); (Fascist + will + democrats); (Terrorists + extreme + right); (Provoke + violence + Vallecass); (Today + ultras + VOX); (Ultras + VOX + went); (VOX + went + provoke); (Went + provoke + violence); (Violence + Vallecass + open); (Vallecass + open + thread); (Headquarters + Podemos + Cartagena); (Against + violence + but); (Violence + but + excuses); (But + excuses + balls)
Más Madrid	(Monica + Garcia + g); (More + green + more); (More + fair + more); (More + high + more); (High + more + far); (More + far + more); (Far + more + strong); (More + strong + more); (Strong + more + fair); (Fair + more + green); (Green + more + Madrid); (Más + Madrid + win); (Madrid + Win + straight); (Win + final + stretch); (Candidate + Mónica + García)	(Isabel + Díaz + Ayuso); (All + my + repulse); (My + repulse + condemnation); (Repulse + condemnation + threats); (Condemnation + threats + suffered); (threat + suffered + my); (Suffered + my + support); (My + support + Isabel); (Support + Isabel + Díaz); (Díaz + Ayuso + behaviours); (Ayuso + behaviours + have a place); (Behaviours + have a place + democracy); (All + my + solidarity); (Solidarity + my + condemnation); (My + condemnation + absolute)
PSOE	(Teambilondo + psoc + m); (Psoe + M + Shangaycom); (M + Shangaycom + Lgtbsoe); (Make + more + free); (Shangaycom + Lgtbsoe + many); (Lgtbsoe + many + Thanks); (Freedom + go + vote); (go + vote + DoltForMadrid); (Threats + violence + never); (Violence + Never + silenced); (Never + silenced + voice); (Silence + voice + democracy); (Voice + Democracy + Freedom); (Democracy + Freedom + prevail)	(Happened + Vallecass + serious); (Vallecass + serious + extremism); (Serious + extremism + feeds); (Extremism + feeds + extremisms); (Feed + extremisms + attitudes); (Extremisms + violent + attitudes); (Attitudes + violent + always); (Violent + always + rejectable); (Always + rejectable + stop); (Rejectable + stop + spiral); (Stop + spiral + make it); (Spiral + make it + democratically); (Make it + democratically + voting); (Democratically + voting + massively); (Voting + massively + convictions)
Ciudadanos	(Together + going + win); (Respect + Tolerance + Freedom); (4m + together + going); (Madrid + convivence + respect); (4 + May + ChooseCentre); (Tolerance + freedom + concord); (Freedom + concord + moderation); (concord + moderation + centre); (moderation + Centre + WeWant); (Centre + WeWant + region); (WeWant + Region + 4); (Region + 4 + May); (Work + help + flourish); (Help + flourish + create); (Thanks + lagoado + you)	(Machinery + Mud + Plenary session); (Mud + Plenary session + performance); (Plenary session + performance + fake); (Performance + fake + news); (Ayuso + irresponsible + liar); (Irresponsible + liar + Madrid citizens); (Liar + Madrid citizens + deserve); (Aggressions + VOX + Vallecass); (Condemn, threats, Pablo); (Threats, Pablo, Iglesias); (Pablo, Iglesias, aggressions); (Churches, aggressions, VOX); (VOX, Vallecass, condemn); (Vallecass, condemn, harassment); (Condemn, harassment, Cs)
PP	(Freedom + 4 + may); (Isabel + Díaz + Ayuso); (Communism + freedom + 4); (Next + 4 + May); (ImWithAyuso + ! + !); (Socialism + freedom + 4); (Love + respect + Madrid); (Respect + Madrid + Spain); (Project + freedom + idiazayuso); (4m + play + freedom); (Elections + love + respect); (Madrid + Spain + ask); (Spain + ask + next); (Ask + next + 4); (4 + May + Unite)	(Threats + representatives + public); (Representatives + public + country); (Public + country + freedom); (Country + freedom + my); (My + condemnation + indescribable); (Condemnation + indescribable + lasts); (Indescribable + lasts + acts); (If + Madrid + so); (Madrid + so + inhuman); (so + inhuman + drunk); (Inhuman + drunk + insecure); (Drunk + insecure + sexist); (Insecure + sexist + racist); (Sexist, racist, unsupportive)
VOX	(Big + Family + VOX); (Happy + eastern + resurrection); (Keep + alive + traditions); (monasterior + Santi + Abascal); (Madrid + VOX + thanks); (4 + may + Spain); (Socialism + freedom + us); (Freedom + We + always); (We + always + defend); (Always + defend + freedom); (defense + freedom + Madrid); (Freedom + Madrid + pays); (Madrid + pays + traitors); (pay + traitors + will); (Traitors + will + Madrid)	(Assault + communist + Madrid); (Treason, citizens, PP); (Citizens + PP + treason); (PP + treason + citizens); (Treason + citizens + Spain); (Citizens + Spain + close); (Spain + close + leaving); (Close + leaving + Inesarrimadas); (Demand + end + curfew); (End + Curfew (Toque + queda in Spanish); (Curfew + could); (Curfew + could + make); (Could + make + all); (Make + all + autonomies); (All + autonomies + them)

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Declarations

Research Involving Human Participants and/or Animals This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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References

- Gasiorowski MJ. Economic crisis and political regime change: an event history analysis. *Am Polit Sci Rev*. 1995;89(4):882–97.
- Sampedro V, Lobera J. The Spanish 15-M Movement: a consensual dissent? *J Span Cult Stud*. 2014;15(1–2):61–80.
- Romanos E, Sádaba I. De la calle a las instituciones a través de las apps: consecuencias políticas de las prácticas digitales en el 15M. *Rev Int Sociol*. 2016;74(4):e048–e048.
- Orriols L, Cordero G. The breakdown of the Spanish two-party system: the upsurge of Podemos and Ciudadanos in the 2015 general election. *South European Society and Politics*. 2016;21(4):469–92.
- CIS. Spanish Sociological Research Centre (Centro de Investigaciones Sociológicas): Barómetro de Octubre de 2018 (Study N° 3226); 2018. Available from: http://www.cis.es/cis/openncm/ES/1_encuestas/estudios/ver.jsp?estudio=14430.
- CIS. Spanish Sociological Research Centre (Centro de Investigaciones Sociológicas): Barómetro de Febrero de 2020 (Study N° 3273); 2020. Available from: http://www.cis.es/cis/openncm/ES/1_encuestas/estudios/ver.jsp?estudio=14485.
- CIS. Spanish Sociological Research Centre (Centro de Investigaciones Sociológicas): Encuesta metodológica. Elecciones Comunidad de Madrid 2021 (Study N°3321); 2021. Available from: http://www.cis.es/cis/openncm/ES/1_encuestas/estudios/ver.jsp?estudio=14566.
- Casey N. In: Debate Over Conquistadors 500 Years Ago, Spanish Right Sees an Opportunity. *The New York Times*. 2021 Oct. Available from: <https://www.nytimes.com/2021/10/09/world/europe/spain-conservatives-conquistadors.html>.
- CIS. Spanish Sociological Research Centre (Centro de Investigaciones Sociológicas): Preelectoral elecciones autonómicas 2021. Comunidad de Madrid (Study N°3317); 2021. Available from: http://www.cis.es/cis/openncm/ES/1_encuestas/estudios/ver.jsp?estudio=14566.
- López-García G, Pavía JM. Political communication in election processes: an overview. *Contemporary Social Science*. 2019;14(1):1–13.
- Chadwick A. *The hybrid media system: Politics and power*. Oxford University Press; 2017.
- Freelon D, Karpf D. Of big birds and bayonets: hybrid Twitter interactivity in the 2012 presidential debates. *Inf Commun Soc*. 2015;18(4):390–406.
- Russell Neuman W, Guggenheim L, Mo Jang S, Bae SY. The dynamics of public attention: agenda-setting theory meets big data. *J Commun*. 2014;64(2):193–214.
- Moon SJ, Hadley P. Routinizing a new technology in the newsroom: Twitter as a news source in mainstream media. *J Broadcast Electron Media*. 2014;58(2):289–305.
- Congosto ML, Fernández M, Moro E. Twitter y política: información, opinión y predicción? In: *Cuadernos de Comunicación Evoca*. 4. Comunicación Política 2.0. Oxford: Evoca Comunicación e Imagen; 2011. p. 11–17. Available from: https://e-archivo.uc3m.es/bitstream/handle/10016/21631/twitter_congosto_EVOCA_2011.pdf.
- Alonso-Muñoz L, Casero-Ripollés A. Political agenda on Twitter during the, Spanish elections: issues, strategies, and users’ responses. *Commun Soc*. 2016;2018:7–23.
- Nai A, Schemeil Y, Marie JL. Anxiety, sophistication, and resistance to persuasion: evidence from a quasi-experimental survey on global climate change. *Polit Psychol*. 2017;38(1):137–56.
- Galtung J, Ruge MH. The structure of foreign news: the presentation of the Congo, Cuba and Cyprus crises in four Norwegian newspapers. *J Peace Res*. 1965;2(1):64–90.
- Haselmayer M, Meyer TM, Wagner M. Fighting for attention: media coverage of negative campaign messages. *Party Polit*. 2019;25(3):412–23.
- Gross JH, Johnson KT. Twitter taunts and tirades: negative campaigning in the age of Trump. *PS: Political Science & Politics*. 2016;49(4):748–754.
- Enli G. Twitter as arena for the authentic outsider: exploring the social media campaigns of Trump and Clinton in the 2016 US presidential election. *Eur J Commun*. 2017;32(1):50–61.
- Klein N. *This changes everything: capitalism vs. the climate*. Simon and Schuster; 2015.
- Susanto Y, Cambria E, Ng BC, Hussain A. Ten years of sentic computing. *Cogn Comput*. 2022;14(1):5–23.
- Hussain A, Cambria E, Poria S, Hawalah AYA, Herrera F. Information fusion for affective computing and sentiment analysis. *Inf Fusion*. 2021;71:97–98. Available from: <https://doi.org/10.1016/j.inffus.2021.02.010>.
- Al-Ghadir AI, Azmi AM, Hussain A. A novel approach to stance detection in social media tweets by fusing ranked lists and sentiments. *Information Fusion*. 2021;67:29–40.
- Shah D, Li Y, Hadaegh A. Twitter based sentiment analysis of each presidential candidate using long short-term memory. *Int J Comput Sci Secur*. 2021;15:87–96.
- Gerstlé J, Nai A. Negativity, emotionality and populist rhetoric in election campaigns worldwide, and their effects on media attention and electoral success. *Eur J Commun*. 2019;34(4):410–44.
- Haselmayer M. Candidates rather than context shape campaign sentiment in French Presidential Elections (1965–2017). *French Politics*. 2021:1–27.
- Ernst N, Engesser S, Büchel F, Blassnig S, Esser F. Extreme parties and populism: an analysis of Facebook and Twitter across six countries. *Inf Commun Soc* 2017;20(9):1347–1364. Available from: <https://www.tandfonline.com/doi/full/10.1080/1369118X.2017.1329333>.
- Goffman E. *Frame analysis: an essay on the organization of experience*. Harvard University Press; 1974.
- Van Dijk TA, et al. What is political discourse analysis. *Belgian Journal of Linguistics*. 1997;11(1):11–52.
- Van Dijk TA. Ideology and discourse analysis. *Journal of Political Ideologies*. 2006;11(2):115–40.

33. Hague R, Harrop M. *Comparative government and politics*, vol. 6. Springer; 2004.
34. Goffman E, et al. *The presentation of self in everyday life*, vol. 21. Harmondsworth London; 1978.
35. Lakoff G. *The all new don't think of an elephant!: Know your values and frame the debate*. Chelsea Green Publishing; 2014.
36. Snow DA, Benford RD, et al. Ideology, frame resonance, and participant mobilization. *International Social Movement Research*. 1988;1(1):197–217.
37. Lakoff G. The power of positive persistence. 2018. Available from: <https://georgelakoff.com/2018/01/17/the-power-of-positive-persistence/>.
38. Hussain A, Cambria E. Semi-supervised learning for big social data analysis. *Neurocomputing*. 2018;275:1662–73.
39. Poria S, Gelbukh A, Hussain A, Howard N, Das D, Bandyopadhyay S. Enhanced SenticNet with affective labels for concept-based opinion mining. *IEEE Intell Syst*. 2013;28(2):31–8.
40. Cambria E, Hussain A, Durrani T, Havasi C, Eckl C, Munro J. Sentic computing for patient centered applications. In: *IEEE 10th International Conference on Signal Processing Proceedings*. IEEE; 2010. p. 1279–1282.
41. Satapathy R, Pardeshi S, Cambria E. Polarity and Subjectivity detection with multitask learning and BERT embedding. *arXiv preprint arXiv:220105363*. 2022.
42. Hussain Z, Sheikh Z, Tahir A, Dashtipour K, Gogate M, Sheikh A, et al. Artificial intelligence-enabled social media analysis for pharmacovigilance of COVID-19 vaccinations in the United Kingdom: observational study. *JMIR Public Health Surveill*. 2022.
43. Tumasjan A, Sprenger T, Sandner P, Welpe I. Predicting elections with twitter: what 140 characters reveal about political sentiment. In: *Proceedings of the International AAAI Conference on Web and Social Media*. vol.4; 2010. p. 178–185.
44. Belcastro L, Cantini R, Marozzo F, Talia D, Trunfio P. Learning political polarization on social media using neural networks. *IEEE Access*. 2020;8:47177–87.
45. Khatua A, Khatua A, Cambria E. Predicting political sentiments of voters from Twitter in multi-party contexts. *Appl Soft Comput*. 2020;97:106743.
46. Robles JM, Velez D, DeMarco S, Rodríguez JT, Gomez D. Affective homogeneity in the Spanish general election debate. a comparative analysis of social networks political agents. *Inf Commun Soc*. 2020;23(2):216–233.
47. Ross AS, Caldwell D. 'Going negative': an appraisal analysis of the rhetoric of Donald Trump on Twitter. *Lang Commun*. 2020;70:13–27.
48. Torregrosa J, Panizo-Lledot Á, Bello-Orgaz G, Camacho D. Analyzing the relationship between relevance and extremist discourse in an alt-right network on Twitter. *Soc Netw Anal Min*. 2020;10(1):1–17.
49. Martín A, Huertas-Tato J, Huertas-García Á, Villar-Rodríguez G, Camacho D. FacTeR-Check: Semi-automated fact-checking through semantic similarity and natural language inference. *arXiv preprint arXiv:211014532*. 2021.
50. Huertas-García Á, Huertas-Tato J, Martín A, Camacho D. Countering misinformation through semantic-aware multilingual models. In: *International Conference on Intelligent Data Engineering and Automated Learning*. Springer, Cham; 2021. p. 312–323.
51. Dubey AD. Twitter sentiment analysis during COVID-19 outbreak. Available at SSRN 3572023. 2020.
52. Garcia K, Berton L. Topic detection and sentiment analysis in Twitter content related to COVID-19 from Brazil and the USA. *Applied Soft Computing*. 2021;101:107057.
53. Vilares D, Alonso MA. A review on political analysis and social media. *Procesamiento Del Lenguaje Natural*. 2016;56:13–23.
54. Duarte N, Llanso E, Loup AC. Mixed messages? The limits of automated social media content analysis. In: *FAT*; 2018. p. 106.
55. Wang Y, Croucher SM, Pearson E. National leaders' usage of twitter in response to COVID-19: a sentiment analysis. *Frontiers in Communication*. 2021;6:183. Available from: <https://www.frontiersin.org/article/10.3389/fcomm.2021.732399>.
56. Turner SF, Cardinal LB, Burton RM. Research design for mixed methods: a triangulation-based framework and roadmap. *Organ Res Methods*. 2017;20(2):243–67.
57. Krippendorff K. *Content analysis: an introduction to its methodology* (2nd Thousand Oaks). CA: Sage Publications; 2004.
58. Zamith R, Lewis SC. Content analysis and the algorithmic coder: what computational social science means for traditional modes of media analysis. *Ann Am Acad Pol Soc Sci*. 2015;659(1):307–18.
59. Denzin NK. Triangulation 2.0. *J Mixed Methods Res*. 2012;6(2):80–88.
60. Caracelli VJ, Greene JC. Data analysis strategies for mixed-method evaluation designs. *Educ Evavl Policy Anal*. 1993;15(2):195–207.
61. Caruth GD. Demystifying mixed methods research design: a review of the literature. *Online Submission*. 2013;3(2):112–22.
62. Hillard D, Purpura S, Wilkerson J. Computer-assisted topic classification for mixed-methods social science research. *J Inform Tech Polit*. 2008;4(4):31–46.
63. Lindgren S. Movement mobilization in the age of hashtag activism: examining the challenge of noise, hate, and disengagement in the #MeToo Campaign. *Policy Internet*. 2019;11(4):418–438. Available from: <https://onlinelibrary.wiley.com/doi/abs/10.1002/poi3.212>.
64. Schneiker A, Dau M, Joachim J, Martin M, Lange H. How to analyze social media? Assessing the promise of mixed-methods designs for studying the Twitter feeds of PMSCs. *Int Stud Perspect*. 2019;20(2):188–200.
65. Kreis R. #refugeesnotwelcome: anti-refugee discourse on Twitter. *Discourse Commun*. 2017;11(5):498–514.
66. Chang T, DeJonckheere M, Vydiswaran VV, Li J, Buis LR, Guetterman TC. Accelerating mixed methods research with natural language processing of big text data. *J Mixed Methods Res*. 2021;15586898211021196.
67. Baviera T, Calvo D, Llorca-Abad G. Mediatisation in Twitter: an exploratory analysis of the 2015 Spanish general election. *J Int Commun*. 2019;25(2):275–300.
68. Giménez M, Baviera T, Llorca G, Gámir J, Calvo D, Rosso P, et al. Overview of the 1st classification of Spanish election tweets task at ibereval 2017. In: *Proceedings of the Second Workshop on Evaluation of Human Language Technologies for Iberian Languages (IberEval 2017)*, Murcia, Spain, September. vol. 19. 2017. p. 1–14.
69. Cambria E, Das D, Bandyopadhyay S, Feraco A. Affective computing and sentiment analysis. In: *A Practical Guide to Sentiment Analysis*. Springer; 2017. p. 1–10.
70. Hearst MA. Untangling text data mining. In: *Proceedings of the 37th Annual meeting of the Association for Computational Linguistics*; 1999. p. 3–10.
71. Bodrunova SS. When context matters. Analyzing conflicts with the use of big textual corpora from Russian and international social media. *Partecipazione e Conflitto*. 2018;11(2):497–510.
72. Gianfreda S. Using a mixed-method approach to examine party positioning on immigration and the European Union in Parliamentary Proceedings. SAGE Publications Ltd; 2019.
73. Nelson LK. Computational grounded theory: a methodological framework. *Sociol Methods Res*. 2020;49(1):3–42.
74. Shah DV, Cappella JN, Neuman WR. Big data, digital media, and computational social science: possibilities and perils. *Ann Am Acad Pol Soc Sci*. 2015;659(1):6–13.
75. Cambria E, Xing F, Thelwall M, Welsch R. Sentiment analysis as a multidisciplinary research area. *IEEE Transactions on Artificial Intelligence*. 2022;3(2):1–3.
76. Elayan S, Sykora M, Jackson T. "His tweets speak for themselves": an analysis of Donald Trump's Twitter behaviour.

- International Journal of Interdisciplinary Civic and Political Studies. 2020;15(1):11–35.
77. Meduru M, Mahimkar A, Subramanian K, Padiya PY, Gunjgur PN. Opinion mining using twitter feeds for political analysis. *Int J Comput(IJC)*. 2017;25(1):116–123.
 78. Recuero R, Zago G, Bastos MT, Araújo R. Hashtags functions in the protests across Brazil. *Sage Open*. 2015;5(2):2158244015586000.
 79. Bruns A, Stieglitz S. Towards more systematic Twitter analysis: metrics for tweeting activities. *Int J Soc Res Methodol*. 2013; 16(2):91–108.
 80. González-Bailón S, Borge-Holthoefer J, Moreno Y. Broadcasters and hidden influentials in online protest diffusion. *Am Behav Sci*. 2013;57(7):943–65.
 81. Barberá P, Jost JT, Nagler J, Tucker JA, Bonneau R. Tweeting from left to right: is online political communication more than an echo chamber? *Psychol Sci*. 2015;26(10):1531–42.
 82. Tymann K, Lutz M, Palsbröker P, Gips C. GerVADER - A German adaptation of the VADER sentiment analysis tool for social media texts. In: *LWDA*. 2019.
 83. Cambria E, Schuller B, Xia Y, Havasi C. New avenues in opinion mining and sentiment analysis. *IEEE Intell Syst*. 2013;28(2):15–21.
 84. Sampedro V, Durán R, Seoane F, Farné A. From invisibility to the public sphere: the hybrid media strategy of a new party (Podemos, Spain, 2014–2015). *Int J Commun*. 2021;15:26.
 85. Vaswani A, Shazeer N, Parmar N, Uszkoreit J, Jones L, Gomez AN, et al. Attention is all you need. *Adv Neural Inf Proces Syst*. 2017;30.
 86. Kumar A, Cambria E, Transformer-Based Trueman TE. Representations bidirectional encoder, for emotion detection from text. In: *IEEE Symposium Series on Computational Intelligence (SSCI)*. IEEE 2021;2021:1–6.
 87. Bello-Orgaz G, Jung JJ, Camacho D. Social big data: recent achievements and new challenges. *Information Fusion*. 2016;28:45–59.
 88. Camacho D, Panizo-LLedot A, Bello-Orgaz G, Gonzalez-Pardo A, Cambria E. The four dimensions of social network analysis: an overview of research methods, applications, and software tools. *Information Fusion*. 2020;63:88–120.
 89. Camacho D, Luzón MV, Cambria E. *New research methods & algorithms in social network analysis*. Elsevier; 2021.
 90. Barbieri F, Anke LE, Camacho-Collados J. Xlm-t: A multilingual language model toolkit for twitter. *arXiv preprint arXiv:210412250*. 2021.
 91. McInnes L, Healy J, Melville J. Umap: Uniform manifold approximation and projection for dimension reduction. *arXiv preprint arXiv:180203426*. 2018.
 92. Boyd CP. The politics of history and memory in democratic Spain. *Ann Am Acad Pol Soc Sci*. 2008;617(1):133–48.
 93. Álvarez Junco J. España: el peso del estereotipo. *Claves de Razón Práctica*. 1994;48:2–10.
 94. Oliver JE, Rahn WM. Rise of the Trumpenvolk: populism in the 2016 election. *Ann Am Acad Pol Soc Sci*. 2016;667(1):189–206.
 95. Torregrosa J, Bello-Orgaz G, Martinez-Camara E, DelSer J, Camacho D. A survey on extremism analysis using Natural Language Processing. *arXiv preprint arXiv:210404069*. 2021.
 96. Ridout TN, FranklinFowler E. *Explaining Perceptions of Campaign Tone*. Rochester, NY: Social Science Research Network; 2009. ID 1451395. Available from: <https://papers.ssrn.com/abstract=1451395>.

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