ORIGINAL ARTICLE

The electoral success of social media losers: a study on the usage and influence of Twitter in times of elections in Paraguay

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Abstract

In recent years, social media has become increasingly relevant in democratic decision-making processes, such as referendums or elections. Recent investigations have raised the concern of social media misuse in attempts to manipulate the public opinion and influence results, undermining the foundations of democracy. By analyzing the use of Twitter during the 2017/2018 presidential elections in Paraguay, this study provides empirical evidence and analysis about the role of social media on political campaigns. In a departure from other countries in the region, dominance in this network did not correlate with elections results. The results we highlight in this article, therefore, challenge the impact of social media on elections, offering an interesting view of their role in Latin America countries, like Paraguay.

Keywords Social media · Elections · Democracy · Global south

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Introduction

As social media increasingly becomes a platform for civic discourse (Conroy et al. 2012; Semaan et al. 2014), its influence on public opinion and electoral processes seems to be rising to be on par with other means of political propaganda (Howard et al. 2018; Woolley and Howard 2017). One election after the other, we find reports in different countries arguing how social media like Facebook, WhatsApp or Twitter, have dominated the public debate and even influenced the outcome (Boot 2018; Phillips 2018). Academic research has also started to turn an eye on this phenomena (Metaxas and Mustafaraj 2012), examining if and how social media activity, particularly Twitter, reflects the results of elections (Gayo-Avello 2013; Chung and Mustafaraj 2011), the degree of political misuse of information through fake news, bots and trolls (Morgan 2018), and if and how social media manipulation tactics are undermining our democracies. Just in 2017, evidence of formally organized social media manipulation campaigns has been found in at least 48 different countries, up from 28 in the previous year (Bradshaw and Howard 2018).

Most of these studies focus on North America and Western Europe (Jungherr et al. 2020), while regions where democracies are perceived, by some literature, as more fragile or in development, remain somewhat understudied (Lupu et al. 2020). Latin America at large can be considered as one such region, where research is still scarce even though it has already documented concerns about the use social media to spread disinformation as propaganda mechanisms in concrete case studies (e.g., Caballero and Sola-Morales 2020; Rofrío et al. 2019; Gallagher et al. 2019). Most of this research is characterized as "incipient or experimental," and mostly focused on electoral campaigns, while their social context is described as starting to show some resistance from civil society toward the misuse of digital media (Barredo-Ibáñez et al. 2021). The majority of this research, is based on case studies from the largest economies in the region. Brazil (Gilmore 2012; Oliveira et al. 2017; Machado et al. 2019), Mexico (Sandoval-Almazan 2015b; Tlachino and Macías 2020; León et al. 2021), Argentina (Filer and Fredheim 2017; Welp and Ruth 2017; López-López et al. 2020), and Colombia (Cerón-Guzmán and León 2015b; Correa and Camargo 2017; Chenou et al. 2020) are noticeable examples.

Motivated by this ongoing debate we zoom into the case of Paraguay, one of the least studied from the region on this topic. This research aims to understand the role of Twitter in the context of Paraguayan elections and in doing so contribute to the literature on digital political communication in developing countries. The choice for Paraguay follows the uncommon nature of its electoral politics. In a little over three decades since democracy's return, it has only alternated parties once, albeit only for one shorter presidential period. For some authors, this almost uncontested hegemony of traditional parties, and particularly of one political party that has held power for well over 60 years, is due to how well it controls the levers of political patronage, a phenomena that, in Paraguay, does not only respond to material needs, but also to the "social and emotional bonds" that

link parties to its constituents (Scheffer and Lachi 2020). Even after decades of democracy, and despite political reforms that are supposed to counter patronage by strengthening participatory planning, for example, power still responds more to the interests of local party officials than the interests of local citizens (Setrini and Rocío Duarte-Recalde 2019).

The unique context of traditional representative democracy with one party hegemony makes Paraguay an interesting outlier to explore within the region. It is also the reason why we put a special focus on the primaries of main parties for this case study, something not common in other studies. One of few other studies that have looked into how media, in this case, printed media, influences Paraguayan electoral politics further contributes to this understanding that traditional parties' political and media power remain highly uncontested (Juste de Ancos et al. 2014). How much does social media really change or affect these dynamics? Are new voices ringing louder and mobilizing new forces that were before dormant?. Can the answers to these questions shed some light about the role of social media in electoral politics for small countries with developing democracies?

According to official statistics, 16% of the population in Paraguay uses Twitter (SENATICS 2017). That amounts to approximately a million people, mostly young aged 18 to 25 years old. In 2018, young aged 18–24 represented 21% of eligible voters, and their number continue to grow as years pass by, particularly after automatic registration became law in 2012 (TSJE 2018). To understand the impact of social media in the electoral processes of Paraguay, we characterize the discussion on Twitter during the presidential primaries and the general elections that followed in 2018 by exploring the following research questions:

RQ1 Did political conversations on Twitter, before, during, and after elections, reflect electoral results?;

RQ2 What external events influenced the conversation on Twitter?;

RQ3 Which Twitter profiles influenced the discussion in the network?

In the following sections, we describe our study, present our results and discuss their implications, considering our conclusions relevant to Twitter, acknowledging that other platforms were also available and used during this process, such as Facebook and WhatsApp, but to which this study does not include. Overall, our results contribute to the views that traditional party hegemony are still the main forces behind electoral success, with social media having little effect to counter this hegemony, or as seen by Juste de Ancos et al. (2014) with printed media, simply acting as an extension of that.

Background: Paraguay's electoral process 2017–2018

This section provides a brief overview of the political and electoral context on which this study is developed. The political system in Paraguay is strongly influenced by two main traditional parties—by 2017 80% of the voters were affiliated to these parties (Rojas Scheffer et al. 2017). The Colorado party (ANR by its Spanish acronym) and Liberal party (PLRA by its Spanish acronym) were both founded in 1887 and are also the oldest political parties in Paraguay—from here we will use indistinctly ANR or Colorado to refer to the former and PLRA or Liberal to mention the latter. The number of political parties sprung up significantly in the 90s and onwards, after the democracy was reinstalled. One aspect the new parties share is that they promote an "anti-establishment" discourse. Despite the growing number of new parties, none of them has been able to consolidate itself as a consistent third political force capable of challenging the traditional parties. Therefore, PLRA and ANR continue dominating the political arena.

The Colorado party has held power over the last 70 years, except for the brief period of 2008–2013, when an opposition coalition won the presidential elections. Both, ANR and PLRA are sustained by strong party loyalty at their bases. People adopt a specific party identity because of the family they were born in and other social factors. Members later develop a strong emotional bonds and blind attachment with their party.

There is also a culture of political patronage, favored by the socio-economic situation of the country (low levels of civic education, high levels of poverty, and deficient public services), which serves to reward individuals, securing captive votes (Duarte Recalde 2012).

In Paraguay presidential and parliamentary elections are held every five years. It is mandatory that each party holds primary elections before the general elections. The largest primaries are held by the Colorado party. In 2017, 2,309,061 people were eligible to participate in this election, where the most important political movements were Honor Colorado and Colorado Añetete. Honor Colorado was led by the then President Horacio Cartes and its main candidate was Santiago Peña (former Ministry of Economics under the Cartes' administration). In turn, the Senator Mario Abdo Benítez was the presidential candidate of Colorado Añetete. Mario Abdo won the primaries with 50.93% of the votes. In the Liberal party primary, with 1,362,604 enabled voter's, Efraín Alegre got more than 60% of the votes.

Following the primaries, the general elections took place on 22 April 2018. With 4,241,507 registered voters at stake and a turnout of 61%, the main candidates were Mario Abdo of the Colorado party, and Efrain Alegre, who represented GANAR, an alliance led by the Liberal party. Most pollsters reported an important advantage in favor of Mario Abdo, but eventually he obtained 46.43% of the votes while Efraín Alegre obtained 42.73%.

Related works

From its irruption, social media sites have reconfigured aspects of our democratic societies. One of the topic investigated in this field has been the use of social media as a communication tool during electoral campaigns. In this case, the majority of the literature focused on studies in Western democracies (i.e., North America and Western Europe), remaining the topic understudied in other institutional and political settings (Lupu et al. 2020; Jungherr et al. 2020). Yet, there have been efforts to understand social media's uses and effects under alternative sociocultural contexts, such as Latin America.

In this section, we concentrate our efforts on reviewing the literature at the intersection of social media, politics, and elections in Latin America. We found that the state of the art is dominated by studies that characterize the use of social media by electoral candidates and are contextualized in countries representing the largest economies in the region. About 70% of the reviewed articles studied electoral processes in Brazil, Mexico, Colombia, and Argentina. Also, we saw that the large majority of the studies (78%) chose Twitter as their case study, in part, because of the convenient access to data. To a lesser extent, Facebook, Youtube, Instagram, and, more recently, WhatsApp were examined as well.

Social media use and electoral performance

The majority of the research investigated social media usage by political candidates and parties. They examined candidates' communication strategies (e.g., interactions with constituents, personal opinions about timely topics, proposal broadcasting), messages content (e.g., political agenda, plans, and programs, campaign slogans), and language style (e.g., ideological, confrontation, appealing) during elections in Costa Rica (Romero 2015), Colombia (Correa and Camargo 2017), Mexico (Tlachino and Macías 2020), El Salvador (Aguilar 2018), and Guatemala (Pallister 2021). Similar studies were conducted but focusing on how female presidential and governor candidates of Brazil and Argentina (Welp and Ruth 2017), Mexico (Marañón et al. 2018), and Colombia (Rojas and Boguslavskaya 2018) ran their campaigns on social media, including the tone (e.g., formal, informal), function (e.g., dialogue, report, opinion), and framing (e.g., attribution of responsibility, morality) used in their messages.

Previous investigations in Latin America also sought to understand whether social media helped candidates gain visibility, especially those with restricted political awareness, favoring the equalization of political forces. In this vein, Jara et al. (2017) analyzed if the use of Twitter in Chile aided in reducing the existing inequalities between major and minor candidacies generated by the current political campaign model, which heavily depends on expensive communications through traditional media. The authors found that, at least, at a local level, with a broad spectrum of candidates, Twitter reinforced the awareness difference between candidates.

In addition, scholars analyzed the relationship between candidates' use of social media during elections and their electoral performance. Here results are somewhat

contradictory and seem to depend on whether elections are taking place at a national or local level. Studies on Facebook and Twitter on national elections in Brazil (Gilmore 2012) and Costa Rica (Romero 2017) suggest that candidates' strong social media presence might robustly indicate their popularity at polls. In contrast, Brito et al. found no correlation between candidates' social media use and their votes in the 2018 Brazilian presidential election (Brito et al. 2019). At a municipal level, however, findings are consistent, even in culturally and population density diverse countries. In this sense, candidates' use of social media was reported not to be related to the voting outcome at the local level not only in Brazil (Marques and Mont'Alverne 2016) but also in Costa Rica (Romero 2016), where the context and traditional electoral practices seem to be more decisive.

Along this line, investigations in the context of elections in Mexico (Sandoval-Almazan and Gil-Garcia 2013; Sandoval-Almazan and Valle-Cruz 2018), Peru (Ramos-Sandoval and Blazquez-Soriano 2021), Ecuador (Riofrio et al. 2018), Venezuela, Paraguay, Chile, Panama, Colombia, and Honduras (Mahendiran et al. 2014) provided a general overview of the role of social media in campaigns. They worked on characterizing different aspects of discussions on the social media sphere (e.g., dynamic of the conversation and vocabulary used, actors involved, sources of the shared political information, sentiments, and emotions raised by content generated). In this sense, Sandoval-Almazan and Gil-Garcia studied how activists in Mexico used Twitter and Youtube to voice their concerns, organize protests, and mobilize constituents in the 2012 presidential elections campaign (Sandoval-Almazan and Gil-Garcia 2013). Also, voters' perceptions of candidates on Facebook were analyzed in the context of a local election in the central State of Mexico (Sandoval-Almazan and Valle-Cruz 2018). The authors found an apparent disconnection between people's emotions towards candidacies and the voting outcome; candidates with the best perceptions did not win the election. Likewise, Ramos-Sandoval and Blazquez-Soriano used sentiment analysis techniques to explore people's feelings on Twitter about candidates' performance during the first 2021 Peruvian presidential debate (Ramos-Sandoval and Blazquez-Soriano 2021).

The characterizing of electoral conversations on Twitter was the endeavor of Mahendiran et al., who, using information retrieval techniques, studied the evolving political vocabulary that emerged during presidential election cycles in 2012 in Mexico, in 2013 in Venezuela, Ecuador, Paraguay, Honduras and Chile, and in 2014 in Colombia and Panama (Mahendiran et al. 2014). The approach showed to be promising as an instrument to define dynamic vocabularies that help track real-world events on social media.

Voting outcome prediction

Understanding the degree to which social media activity can predict election outcome in Argentina, Brazil, Chile, Colombia, Ecuador, Honduras, Paraguay, Peru, and Venezuela has been the focus of various research efforts, which used machine learning (i.e., supervised learning) and natural language processing techniques (i.e., sentiment analysis and opinion mining) and reported contradictory conclusions.

Cerón-Guzmán and León-Guzmán applied sentiment analysis in the context of the Colombia 2014 presidential election to investigate the capacity of social media to infer voting intention (Cerón-Guzmán and León-Guzmán 2016). Inconsistencies in the results questioned the inferential potential of Twitter to anticipate election results. Rodriguez et al. obtained similar findings after employing supervised learning to forecast the outcome of the 2017 Chilean elections (Rodríguez et al. 2018).

On the other hand, promising approaches were reported in the context of elections in Brazil (Oliveira et al. 2017; dos Santos Brito and Adeodato 2020), during electoral campaigns in Argentina, Peru, Ecuador, Honduras, and Chile (López-López et al. 2020), and in voting processes in Venezuela, Paraguay, and Ecuador (Gaurav et al. 2013). The authors claimed to successfully demonstrate the potential of sentiment analysis, machine learning, and opinion mining techniques to predict voting results based on the activity on Twitter, Facebook, and Instagram. However, all approaches were retrospective and conducted with data collected after the elections, not actually being a forecasting per se.

Bots presence and impact in elections

In recent years, there has been a growing interest in understanding the influence of social bots, i.e., algorithmically controlled social media profiles that mimic human behavior, in electoral campaigns (Ferrara et al. 2016). Research along this line found evidence of bots' presence on Twitter in the context of elections in Argentina (Filer and Fredheim 2017), Brazil (Arnaudo 2017; Abdin 2019), Colombia (Cerón-Guzmán and León 2015a), Ecuador (Puyosa 2017; Riofrio et al. 2018; Rofrío et al. 2019; Ackerman et al. 2020), and Honduras (Gallagher et al. 2019). According to the authors, these bots have the potential to negatively affect political discussions around elections (Cerón-Guzmán and León 2015a) by artificially inflating the popularity of candidates (Arnaudo 2017; Filer and Fredheim 2017; Riofrio et al. 2018), discrediting political actors through massive attacks (Puyosa 2017; Rofrío et al. 2019), and manipulating the public opinion via large-scale disinformation campaigns (Abdin 2019; Gallagher et al. 2019; Ackerman et al. 2020).

Political news and disinformation

Scholars have examined the quality of news shared on Twitter, Facebook, and WhatsApp during elections in Argentina, Brazil, El Salvador, Mexico, and Venezuela. In this sense, Machado et al. (2018a) and Glowacki et al. (2018) analyzed the sources of political information that circulated on Twitter and Facebook in electoral times in Brazil and Mexico, respectively. They found that most political news shared on social media came from professional news media.

León et al. explored how news coverage and people's social media sharing habits changed in the 2018 Mexican national elections (León et al. 2021). Measuring how foreign news outlets, mainly US-based, shaped the political discourse was investigated by Tsvetkova et al. during the 2015 National Assembly elections in Venezuela (Tsvetkova et al. 2019), finding weak evidence about the influence of the

international broadcasting on social media users' opinions. Along this line, Soares et al. discovered dynamics of polarization generated by news outlets in the Brazilian public opinion during the 2018 presidential elections (Soares et al. 2019). Polarization as an effect of the rise of closed echo chambers created on candidates' WhatsApp support groups were studied by Chenou et al. in the context of the 2018 presidential campaign in Colombia (Chenou et al. 2020).

The spread and impact of disinformation in electoral campaigns were explored in Mexico, Brazil, Argentina, and El Salvador (Lupu et al. 2020; Machado et al. 2019). Authors provide evidence of the circulation of false stories containing hate speech and deception to manipulate public opinion as well as inflammatory content and unsubstantiated claims to attack political rivals and expose ambitious and populist plans.

Offline events and social media

Sandoval-Almazan (2015b) explored how the online perception of the candidates is influenced by offline events associated with their figures. By analyzing the case of Enrique Peña Nieto—former president of Mexico—,during the 2012 presidential campaign, the author found that public embarrassments involving Peña Nieto did not impact his candidacy. Even when these events derived in protests on Twitter, discrediting the image of the former president, they did not have electoral consequences for Peña Nieto, who won the presidency without the general support of the Twitter users.

Besides analyzing the impact of offline events on online political participation, scholars investigated how social media can be employed to discover electoral violence events. Machine learning and natural language processing were employed to monitor Twitter, looking for the existence of violent incidents (e.g., physical attacks on opposition politicians, violence between opposition and incumbent parties, candidate assassination) during the 2015 parliamentary election in Venezuela (Yang et al. 2016). Also, in the context of the Venezuelan parliamentary election of 2015, Muchlinski et al. proposed a neural networks approach to estimate forms of political violence from tweets (Muchlinski et al. 2021). But researchers did not only introduce approaches to monitor electoral incidents through social media but also proposed mechanisms to report them. This is the case of Meng and Khelladi, who implemented a Twitter-based chatbot to collect from voters relevant irregularities during the Dominican 2016 general elections (Meng and Khelladi 2017).

By taking as case studies two national elections, our work contributes to the ongoing discussion of social media's role on electoral seasons in Latin America. It extends the state of art in various aspects. From a general perspective, it broadens the recognized limited literature on digital media in politics from Latin America, a region in which the pervasiveness of social media is similar and even bigger than countries in Western democracies (Sonneland 2017); still, not much attention has received from academia. Within the Latin American region, we saw that Paraguay is one of the less-studied countries. It was not exclusively studied in any of the reviewed articles and was used as a case study together with other countries in only

two out of the reviewed articles (Gaurav et al. 2013; Mahendiran et al. 2014). However, its particular history, political and electoral practices, and social media penetration deserve higher research interest.

Our study answers questions about social media and electoral performance similar to what was previously covered in the literature. However, we saw that the large majority of studies explored the use of social media by candidates, while in our work, we conducted a more comprehensive characterization of the discussion on Twitter, challenging findings that suggest an existing relationship between social media usage and voting outcome (Gilmore 2012; Romero 2017) and complementing investigations that found no association between the candidates' social media presence and their electoral performance (Marques and Mont'Alverne 2016; Brito et al. 2019). The only study that applied a comparable method is Sandoval-Almazan and Valle-Cruz (2018), but, it was conducted on Facebook, whose dynamics, technical affordances, demographics, usages, motivations, and norms of expression were demonstrated to be different from Twitter (Panger 2014; Kalsnes et al. 2017; Alhabash and Ma 2017; Bossetta 2018; Stier et al. 2018; Waterloo et al. 2018).

Another contribution of our work is the study of who and how influence is exercised in electoral discussions on social media. The topic was recently explored in the context of electoral processes in Europe (e.g., Casero-Ripollés et al. 2021; Casero-Ripollés 2021), however, to the best of our knowledge, there have been no research efforts along this line in Latin America. Moreover, our article discusses three interconnected topics: the association between electoral discussions on Twitter and the election outcome, external events' influence on the Twitter conversation, and the identification of actors that influence electoral opinions on Twitter; none of the reviewed studies explored the role of social media in elections in such a broad fashion.

Method

Data collection

Two datasets of tweets were collected from Twitter before, during, and immediately after both the presidential primaries, held on December 2017, and the general elections of Paraguay, that took place on April 2018. In line with previous related works (Cerón-Guzmán and León 2015b; Cerón-Guzmán and León-Guzmán 2016), we used the Twitter's standard search API[1] to collect tweets that mention the accounts of candidates and political parties or movements, as well as tweets that contain hashtags employed to promote the candidacies. Twitter's search function provides access to a sample of tweets from the last 7 days from the moment of the query. Our collection method ran once a week, assuming that the resulting tweets would draw a representative sample of the conversation around the electoral process. The use of

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[1] Our toolset used Tweepy, a well-known python library for this purpose: http://docs.tweepy.org/en/v3.5.0.

Table 1 Details of the dataset used in the study

Dataset	Primary election Colorado party 17 December 2017	General elections 22 April 2018
Collection date	24 Nov. 2017 to 15 Jan. 2018	15 March 2018 to 3 May 2018
Example of hashtags	ParaguayDeLaGente, JuntosHagamosMas	EsAhora, ParaguaySeMueve
Example of accounts	SantiPenap, MaritoAbdo	EfrainAlegre, MaritoAbdo
Total Tweets	145,615	104,505
Unique accounts	23,245	20,680
Retweets	92,727	57,748
Replies	35,719	27,877
Original tweets	11,536	12,877
Quotes	5633	6003

hashtags to capture relevant campaign tweets is an established method in the state of the art as shown by the several studies that employed this method (Cerón-Guzmán and León 2015b; Sandoval-almazan 2015a; Cerón-Guzmán and León-Guzmán 2016; Yang et al. 2016; Puyosa 2017; Arnaudo 2017; Oliveira et al. 2017; Machado et al. 2018b; Aguilar 2018).

Tweets about the primary elections were collected from November 24 in 2017 to January 15 in 2018. We searched for hashtags used in the electoral campaigns (e.g., *#ParaguayDeLaGente*, *#JuntosHagamosMás*) and mentions to candidates and movements Twitter accounts (e.g., *@SantiPenap*, *@MaritoAbdo*). The selection of hashtags was primarily based on publications from local newspapers, which reported the hashtags used by political parties and movements to promote candidacies on Twitter. Additionally, we partnered the NGO Tedic[2] to help us in preparing a exhaustive list of campaign hashtags, including candidacies of all over the country. We restricted our collection only to tweets in Spanish. Although we collected tweets regarding the primary elections of various political parties in Paraguay, we focus this study on the Colorado party, the biggest party of the country. In total, 145,615 tweets authored by 23,245 unique users were gathered about the primary election of the Colorado party. Most of the tweets are retweets of existing publications (64%, 92,727 out of 145,615). The rest of the data are composed of replies (24%, 35,719), original tweets (8%, 11,536), and quotes (4%, 5633).

Tweets about the presidential elections were collected from March 15th, 2018 to May 3rd, 2018 using the method of the primaries, i.e., search for campaign hashtags and mentions of the politician accounts and only tweets written in Spanish. In this case, 104,515 tweets posted by 20,680 unique users were obtained. Similar to the primaries, most of the publications are retweets (55%, 57,748 of 104,505), following by replies (27%, 27,877), original tweets (12%, 12,877), and quotes (6%, 6003). Table 1 summarizes the information about the dataset.

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[2] Tedic is a Paraguayan NGO that works on online platforms and digital rights https://www.tedic.org/.

Data processing

By looking at the hashtags and mentions included in the Tweets, we labeled the tweets to indicate the political party or movement associated to the publication. When a tweet contained a majority of hashtags, or mentions related to, a candidacy, party, or movement, we classified that tweet as being associated with that political group, and added a label to the tweet to persist the classification. Following this procedure, we labeled original tweets, replies, and quotes; re-applying original tweet labels to its retweets. By labeling a tweet with the name of a movement, party, or candidate, we indicate only that its content is primarily about that movement, party, or candidate. The label does not necessarily indicate a statement of support.

Similarly, we classified users according to their political preference. In our classification, a user is labeled as a supporter of a specific party or movement if she used any of the campaign hashtags associated with that party or movement more often than others. This assumes that the use of campaign hashtags represents explicit political support. A manual inspection of a representative sample of the tweets (722 in total, 368 of the primary election, and 354 of the general election) confirmed the validity of the assumption. Two authors of the article acted as annotators and inspected manually and independently the entire sample labeling each tweet with 1 if the content—including hashtags and text—shows support for a candidacy, 0 otherwise. With an agreement of 88% between annotators, they found that the large majority of the labeled tweets (85%) used hashtags to endorse candidates. The size of the samples was computed using the Cochran's formula (Kotrlik and Higgins 2001), considering a 5% of margin error, a 95% of sampling confidence level, and population size of 8601 tweets for the primary (i.e., only no retweets that contain at least one campaign hashtags) and 13,192 tweets for the general election.

Additionally, to further limit potentials misclassifications, we did not consider in our analysis the political support that could be expressed without official hashtags, a much harder task to perform automatically, e.g., through positive opinions in the text of the Tweet. Users who did not use campaign hashtags were simply considered as having "neutral" political preference. A better, more accurate and comprehensive method of analyzing political support in tweets are left for future iterations of the study.

Data analysis

Tweets were analyzed using descriptive statistics. Frequency analysis was conducted to draw the distribution of tweets by type (i.e., original, quote, reply, and

retweet), by political party, movement, candidates, by users, and by date and time. Also, frequencies allowed us to uncover dynamics in the evolution of tweets over time. Proportions were calculated to represent summary information.

To investigate who and how social influence was exerted in the discussion about the Paraguayan elections, networks of interactions between users who participated in the conversation were built. Two users are connected in the networks if there is at least one interaction between them. Specifically, we focused on the interactions received by the users from the other members of the network. Meaning, a user A received an interaction from a user B if the user B (i) post a tweet mentioning the screen name of A; (ii) retweet a tweet published by A; (iii) reply to a tweet posted by A; and (iv) quote a tweet of A. By following these rules, we calculated the interactions that each user received (i.e., retweets, replies, quotes, mentions) with the intuition of looking for influential users. After constructing the networks, we used Gephi[3] and layout algorithms (Jacomy et al. 2014) to explore and manipulate network visualizations, seeking to understand their structure, nodes, and emergent relationships. Visual clues, like node size and colors were employed to ease the exploration. Once identified the prominent actors (nodes) in the network, we delved into their interactions using descriptive statistics. The method to study influence on Twitter is aligned with the approach proposed by Del Fresno García et al. (2016), who identified social media influencers by creating and analyzing a network of users in which connections were operationalized through direct interactions (retweets, mentions) among them. Moreover, user interactions were highlighted as a reliable metric to establish connection on between users on social media networks, contrary to followers rank, which is usually employed to set network links (Casero-Ripollés et al. 2021).

Results

Every 30 s a tweet about the Colorado primary election was posted during the time window of study. Almost 3000 tweets per day were published about this electoral process between November 2017 and January 2018. The frequency of tweets was slower in the general election. Here, a tweet was posted approximately every 40 s. Also, the average number of daily tweets was a bit less in the general election; more than 2,000 tweets a day were published about this voting process. Unexpectedly, the primary election of a single party generated more conversation than the general voting process. The factors that might explain this situation are discussed next, together with the presentation of the results.

RQ1: Winners on Twitter but losers in the ballot box

An interesting phenomenon appears when analyzing the distribution of tweets per political group (i.e., party or movement). The group that dominated the conversation

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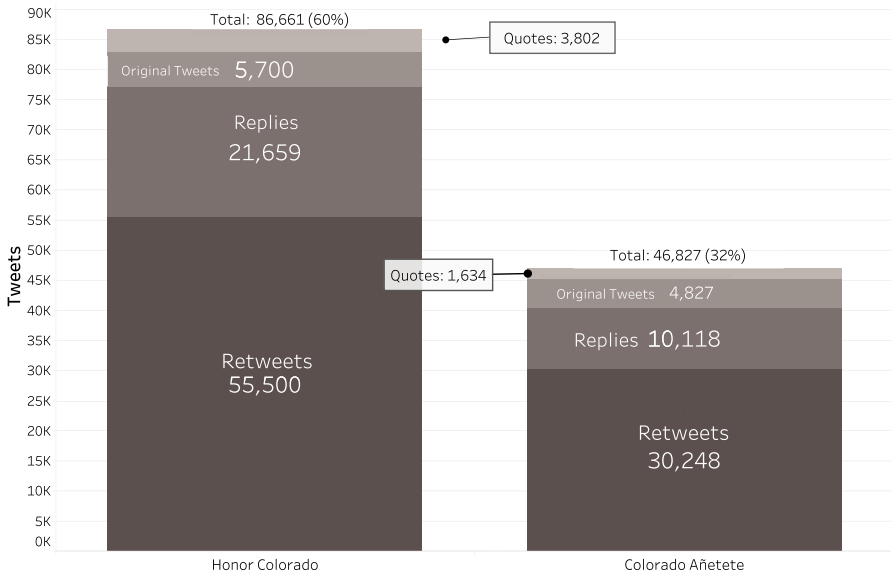[3] For more information about Gephi, see https://gephi.org.

Fig. 1 Distribution of tweets by the two biggest movements of the Colorado party. The remaining tweets are either related to both movements or distributed among other minor movements
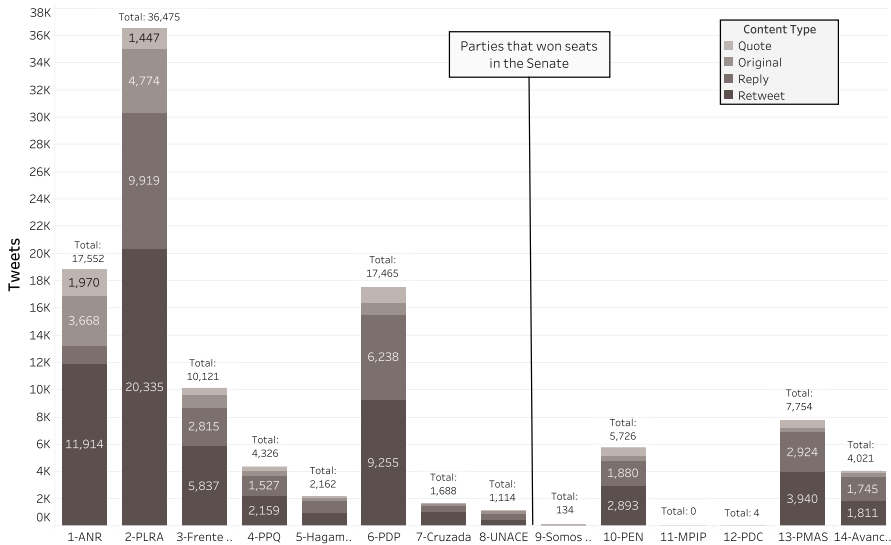

Fig. 2 Distribution of tweets by the political movements and parties that participated in the national election

on Twitter lost in the ballot box. In the primary election of the Colorado party, the movement Honor Colorado, that supported the former government of Paraguay, generated the largest volume of tweets, as shown in Fig. 1, however, their presidential

candidate arrived in the second place at the end of the electoral process. The result is consistent with what we found in the general election where as depicted in Fig. 2, the dominant party in Twitter, i.e., the Liberal party (PLRA), obtained 3.7% fewer votes than the Colorado party (ANR), which won the election.

In Fig. 2, we can also see that the volume of tweets does not reflect the results in the Senate; parties, such as PEN and PMAS, which generated an important amount of content did not get politicians in the Senate. In contrast, political groups like PPQ and UNACE, or the newcomers Hagamos and Cruzada Nacional, obtained successful electoral outcomes with limited number of tweets—yet the formers are political groups with a more consolidated political trajectory. Along this line, the volume of tweets generated by the PDP party was inconsistent with its position in the Senate race. It was the third party in relation to the total number of tweets but the Senate candidacies of political groups with fewer Twitter activity, i.e., Frente Guasú, PPQ, and Hagamos, were more electorally successful. Again here, the activity of parties in Twitter does not show to be related with the voting results.

Acknowledging that social media in general and Twitter in particular is not an unbiased—self-selection bias is present since people tweet on a voluntary basis—neither a representative sample of the voting population, we expected that the activity on Twitter might reflect at some point the electoral results, as happened, for example, in the 2018 national elections of Mexico and Brazil where the political groups that dominated the discussion on social media obtained the preference of the citizens in the ballot box (Gilmore 2012; Machado et al. 2018b; Hedman et al. 2018). Here, we do not pretend to achieve any sort of prediction of the voting outcome, which, although some scholars report positive results (Tumasjan et al. 2010), others are skeptical about the predictive power of social media sites (Gayo-Avello et al. 2011; Gayo-Avello 2012; Metaxas and Mustafaraj 2012). However, this disconnection we have found between the conversation on Twitter and the results of the election led us to look further into our data, to elaborate more on this finding.

In the primary election of the Colorado party, we noted that the two biggest movements followed different strategies in their campaigns on Twitter. In contrast to the pro-government movement Honor Colorado that focused their activities in promoting the movement themselves, the opposing movement Colorado Añetete prioritized the figure of their presidential candidate Mario Abdo, 98.96% of their tweets were related to boost the candidacy of Abdo. Similar results were found in the general election where the winner party, i.e., Colorado party, focused their efforts in advertising the presidential candidacy while the alliance GANAR, the runner-up, concentrated their actions in the promotions of the parties that integrate this political alliance. The apparent difference in the social media campaign strategies might explain the disconnection between the conversations on Twitter and the actual electoral results.

An interesting result connected to this research question is that we found the presence of users that explicitly identify themselves as supporters of a specific political group (party or movement) but most of their interactions, i.e., replies, quotes, mentions, were with accounts identified with the other parties and movements. We call these users cross-party profiles. Even though they do not represent a large proportion of the unique users that participated in our case
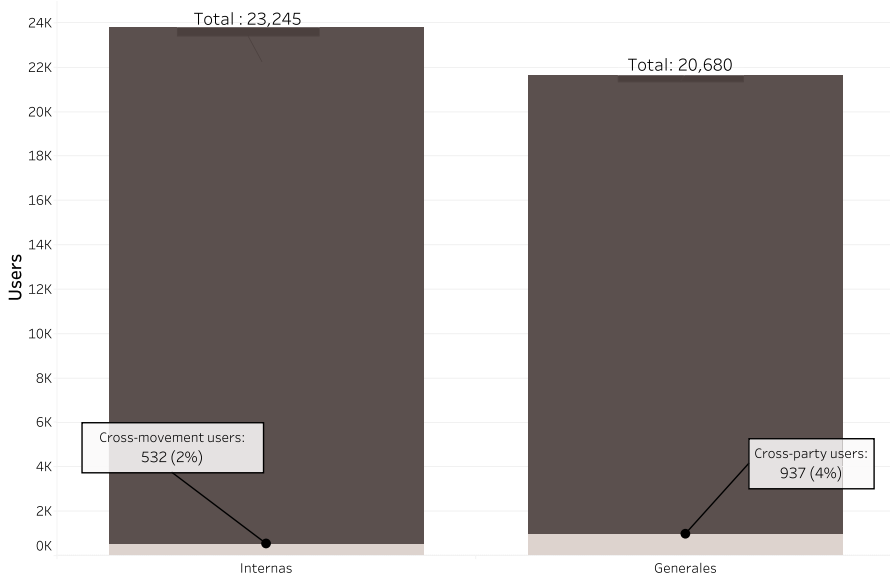
Fig. 3 Distribution of users by election (gray); distribution of cross-movement/party users by election (light gray)

studies—2% and 4% in the primary and general election, respectively, as shown in Fig. 3. A deep-dive into their behavior showed that their main purpose was to retweet publications that criticized the opposing candidate, movement, or party—64% and 60% of their publications in the general and primary election, respectively, were retweets—and to interact in threads of discussions with partisans of the opposing movement or party. One-quarter of the 12,111 and 19,672 tweets generated by the cross-party profiles in the primary and general election, respectively, were replies to posts created by supporters of opposing movements/parties.

It is very likely that the intention of these discussions was not necessarily friendly but characterized by attacks however further analyses are required to determine the tone and content of the discussions. During the general elections, this behavior was continued by profiles of the Colorado party, while it was the opposite for profiles associated with parties of the GANAR alliance. In the case of the latter, these profiles created echo chambers, mostly interacting with content of the alliance, either retweeting publications that favored their candidates or to participate in discussions with their fellow alliance members. Evidence of echo chambers in political discussions was also reported during presidential elections in Brazil (Soares et al. 2019) and Colombia (Chenou et al. 2020), although, in the first case echo chambers emerged as consequence of polarized debates generated between followers and opponents while in the second the presence on this phenomena was observed but within non-public Whatsapp group chats.
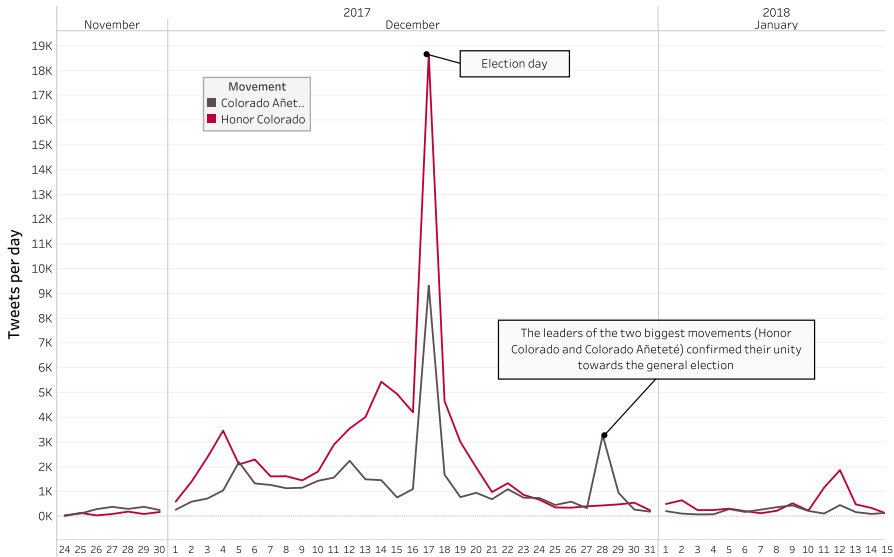
Fig. 4 Evolution of tweets per day during the primary election of the Colorado party. Only the two biggest movements were depicted

RQ2: Online conversation shaped by offline events

In both electoral processes, the generation of tweets increased over time until reaching a peak, after which the conversation about the elections began to decrease. Although, both voting events show to have, in general, a similar pattern in the evolution of their publications overtime, a closer inspection on the distribution of tweets per day uncovers that each process has its own dynamics.

For the primary election of the Colorado party, the number of tweets per day increases gradually until December 17 2017, the election day. More than 30,000 tweets were published on this date. As shown in Fig. 4, after the election the number of tweet decreases drastically with a small peak on December 28, 2017—day in which the movements Honor Colorado and Colorado Añeteté came together in pursuit of the victory in the general election. Doing the same analysis but this time per each movement, we observed that the pro-government movement (Honor Colorado) generated consistently more tweets than the opposing movement over the entire period of study. This is expected according to the previous results (RQ1) that showed that the government-supporter movement created in general more tweets than its counterpart.

The analysis of the evolution of tweets over time is more interesting in the general election because in this case there have been several offline events—not only the actual voting day—that apparently shaped the conversation on Twitter. The first situations that seemed to influence the discussion on the general election on Twitter were the publication of election polls, which estimated a landslide victory of the Colorado party candidate over the Liberal party aspirant (the polls reported a
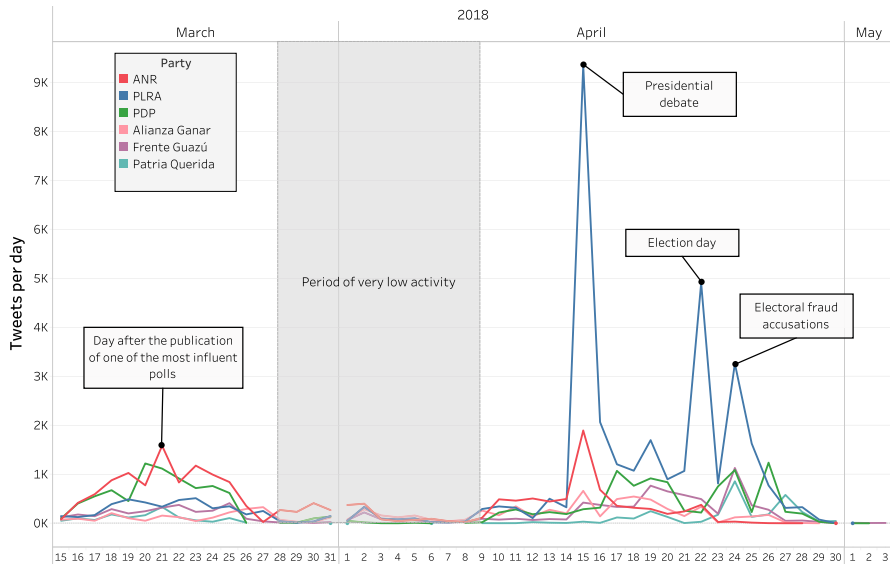
Fig. 5 Evolution of tweets per day during the 2018 Paraguay general election. Only the most active parties on Twitter were depicted

difference of 31% in the voting intention). The result of these apparent manipulated polls might explain, on the one hand, the spike immediately after their publication and, on the other hand, the posterior period of low activity, see Fig. 5. The feeling of success and loss in the main political groups could discourage the participation of the, at that moment, losers. The level activity increases slowly 10 days before the election. On the day of the presidential debate between the two leading candidates (April 15, 2018), the volume of tweets reached the maximum peak. Right after the debate, the number of tweets per day decreases again until the voting day (April 22, 2018). Fraud complaints from the electoral losers might be the reason for the late conversation peak after the election.

The evolution of tweets over time shows that apparently exist, at least in these cases of study, a strong influence of the external events in the conversation on Twitter. Consistently with findings of previous investigations (Carlisle and Patton 2013; Sandoval-Almazan 2015b; Bessi and Ferrara 2017), this study also shows that the level of discussion on this social media seems to be very dependent on what happened outside Twitter.

RQ3: The power of the neutral users and the influence of non-political actors

We analyzed the network of interactions between users who participated on Twitter of the conversation about the elections. By looking at the networks of primary (see Fig. 6) and general elections (see Fig. 7), we can see that most of the traffic around these electoral processes came from "neutral" users, i.e., users who did not
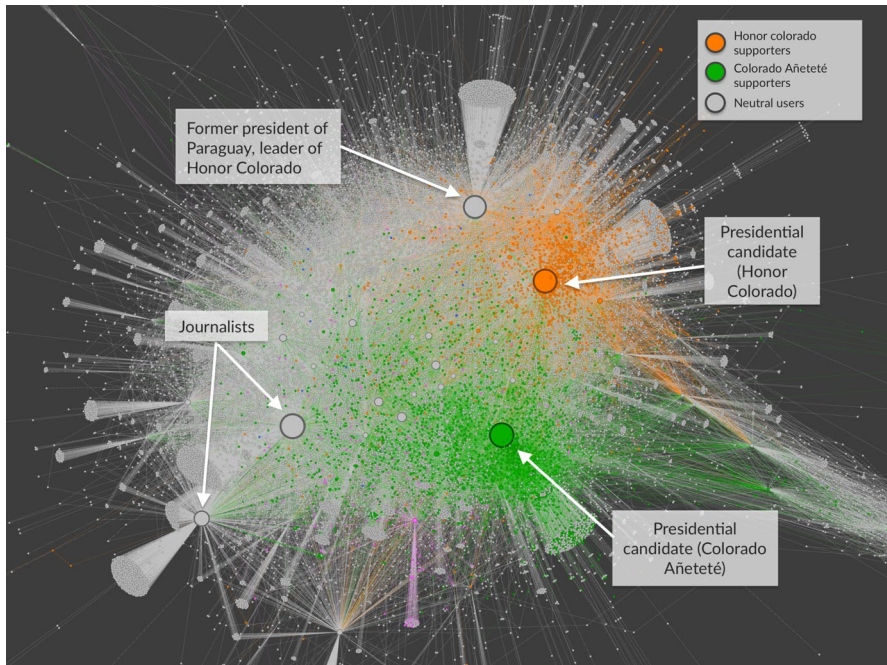
Fig. 6 Network of interactions generated during the primary election of the Colorado party. The circles represent the users and the lines among them illustrate the interactions (via retweets, replies or quotes). The size of the circles is proportional to the number of interactions that the profile received. Thus, profiles represented by large circles are relevant within the network due to the large number of interactions they received, that is, they were frequently mentioned and their tweets attracted an important volume of responses, retweets, and quotes. The position of the clusters in the figure was arranged by the algorithm used to spread nodes throughout the space and does not have any special meaning

use campaign hashtags to express their political preferences. The prevalence of the neutral users—represented with the color grey in the figures—was more important in the general election where almost 60% of total content was generated by them. In the primary election of the Colorado party, 50% of the tweets were published by neutral users.

The network of interactions confirmed the expected influence of the electoral candidates, especially the presidential aspirants and relevant political actors, such as Horacio Cartes, leader of Honor Colorado, one of the two biggest movements of the Colorado party and president-at-the-time of Paraguay. In both, the primary election of the Colorado party as well as in the general election, the Twitter profile of the presidential candidates have a strong influence in the network because, as expected, they received a large volume of interactions. However, and contrary to previous similar studies (Casero-Ripollés 2021), results, in our case, unexpectedly uncover the prominent role of non-political actors, such as journalists, on the network. In particular, we found how the conversation of the primary election of the Colorado party was strongly influenced by two public figures, who work as journalists in
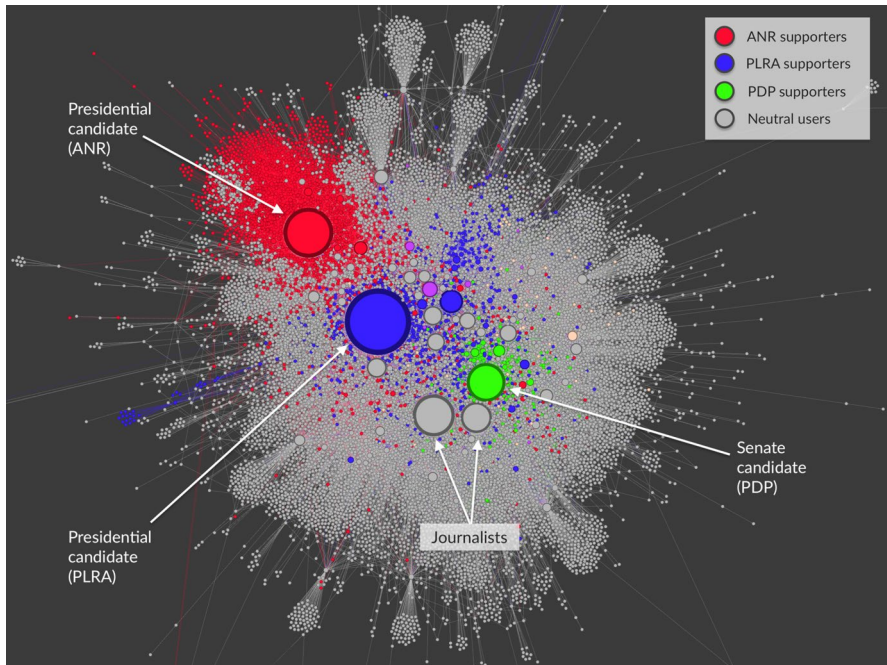
Fig. 7 Network of interactions generated during the 2018 Paraguay general election. The circles represent the users and the lines among them illustrate the interactions (via retweets, replies or quotes). The size of the circles is proportional to the number of interactions that the profile received. Thus, profiles represented by large circles are relevant within the network due to the large number of interactions they received, that is, they were frequently mentioned and their tweets attracted an important volume of responses, retweets, and quotes. The position of the clusters in the figure was arranged by the algorithm used to spread nodes throughout the space and does not have any special meaning

mainstream media groups, see Fig. 6. A similar phenomenon happened during the general election where one of the reporters whose publications influenced the primary process plus other two journalists have a relevant role in the conversation.

A detailed analysis of the influencers indicated that the importance of these users was mainly due to the large volume of retweets that concentrated their publications; publications that in their vast majority were massively re-distributed by neutral users, i.e., those who did not express their electoral preferences by using the campaign hashtags. It is interesting to note that although the retweets were by far the main interactions received by these users, the mentions of these users' screen names and the replies to their publications remained constant over time. Some of these journalists have had very critic positions regarding the candidates so it could have been thought that the responses and mentions were used by the supporters of the candidates to counteract the opinions of the journalists. However, we saw that similar to what happened with the retweets, the majority of the responses and mentions to the influencer journalists came from users who did not manifest their political preferences through the hashtags of the campaign. The stance taken by these

journalists on political events that occurred on Paraguay before the election might contribute to increase and sustain their influence on Twitter, as shown by Casero-Ripollés et al., who reported that the external context highly affect the dynamics of influence on social media (Casero-Ripollés et al. 2021).

Discussion

Seizing the context of the Paraguayan electoral year, our study explored the role of Twitter before, during, and after the Paraguayan primaries and general election. We built a dataset of more than 200,000 tweets around these elections, compiling analysis, and results that characterize an important part of the online conversation during elections. In the following section, we discuss the answers to our research questions as informed by the findings presented in the previous sections.

RQ1: Did political conversations on Twitter, before, during, and after elections, reflect electoral results?

In contrast to what has happened in other countries (Gilmore 2012; Romero 2017; Machado et al. 2018b), our analysis found no correlation between the volume of content generated by political parties and their supporters, and their success or failure in the elections.

However, as noted in our review of literature, this relationship between electoral performance and social media use has been studied before, with mixed results. Either focusing on candidates' usage (Gilmore 2012; Marques and Mont'Alverne 2016; Romero 2015; Correa and Camargo 2017; Tlachino and Macías 2020; Aguilar 2018; Pallister 2021; Marañón et al. 2018; Rojas and Boguslavskaya 2018; Welp and Ruth 2017; Jara et al. 2017; Romero 2016, 2017) or on conversations among other users (Sandoval-Almazan and Valle-Cruz 2018; Sandoval-Almazan and Gil-Garcia 2013; Ramos-Sandoval and Blazquez-Soriano 2021; Riofrio et al. 2018; Mahendiran et al. 2014), research has struggled to find a connection. Our work has looked into both candidates' and citizens' conversations, including also social network analysis to identify influential users, and the lack of correlation is consistent with what we have found in literature: social media alone does not seem to be enough.

The level of adoption of Twitter by Paraguayans could be a key factor of this result: only 16% use Twitter. While this percentage doubles in the 24–35 age group (SENATICS 2017), it still represents a minority. One way to further our understanding of this result would be to peer into the content of these online conversations through qualitative lens, analyzing their raw text and categorizing them by their semantics. If most of the tweets around the elections-loser/twitter-winner had negative semantics, then these online conversations would correlate with electoral results. The kind of content analysis needed to support this assertion remains as an opportunity for future work, where some of the promising sentiment analysis approaches we have reviewed (dos Santos Brito and Adeodato 2020; Oliveira et al. 2017), can be tested and refined, even if they are still retrospective.

The social, economic, and political features of the Paraguayan electoral context also factors in these results. The hegemonic power of the Colorado party is one of these features. It has held power for most of the last seven decades, except only the short 2008–2013 period, when an opposition coalition won the presidential elections. The party has sustained and perpetuated its dominance installing a system of political patronage and cronyism, which resulted in the use of state resources to fund electoral campaigns, and discretionary awarding of public contracts to certain economic groups in order to secure private funding (Setrini 2010). In addition, the party maintains a massive and high functioning structure based on committees, with presence in every city of the country. The local committees monitor the community needs for medicine, healthcare or employment and meet these needs using state resources. The "beneficiaries" are expected to pledge loyalty to the party with their vote and political activism (Morínigo 2008). Furthermore, the committee members are in charge of transporting voters on election day from their house to the voting center and back. A crucial activity to win elections. Herding of voters and public employees on election day is a common and widely practiced activity (Morínigo 2008; Rivarola et al. 2009).

The Liberal party, as well as other smaller political parties and influential political leaders use a similar approach (Morínigo 2008). However, the extent of their influence is limited as they have not achieved the territorial presence nor the dominance over the executive branch, at national or municipal level, that the Colorado party has. Therefore, they cannot distribute as many benefits. In this scenario, opposition parties cannot easily develop a long-standing alternative political force, and political campaigns and debate, for instance on Twitter, do not yet define the outcome of elections as much as the mix of tradition, cronyism, dependency, and community level activism that characterize the political culture of the country.

The political patronage or clientelism that fuels these structures in Paraguay is not only about material needs, but is also about social and emotional links between parties and their constituents (Scheffer and Lachi 2020). This signals the relevance of external events and conversations having more weight in the electoral outcomes than what can be observed on social media, as we have seen in literature (Sandoval-Almazan and Valle-Cruz 2018; Marques and Mont'Alverne 2016; Romero 2016). As noted by previous work (Juste de Ancos et al. 2014) with other forms of media, the power to mobilize voters to polling stations, by traditional parties, is still one of the main forces behind electoral success, and social media may still have little effect to counter this phenomena, or may still have not sufficient reach or usage to show that something else is happening beyond it.

Socio-cultural aspects aside, online conversations on Twitter do offer a few interesting insights about the electoral process, starting on the different behaviors displayed by party promoters and supporters of the contenders. Our data showed how runner-up related conversations on Twitter, both during primaries and general elections, focused on the whole of their political groups or movements. On the other hand, the approach for the winning candidate was different, with his figure at the center of most conversations. It is hard to assert how conscious was the choice for emphasis from the different campaigns, but it does reflect on the official campaign hashtags, which in the case of the winning Mario Abdo made more use of his name

than opponents (e.g., *#MaritoDeLaGente*, *#MaritoDebate*, *#MaritoPresidente*). Even more so, this pattern was sustained through two highly contested elections. Efrain Alegre, the runner-up, had his figure at the center stage during a considerably less contested primaries, but did not sustain it in the general elections. Generalizing this candidate versus movement emphasis as a "winning" political campaign strategy might be going too far, but understanding why it came to be this way in the first place might help deepening our answers to how Twitter conversations are connected with electoral results.

One influential event that preceded the electoral process, and which may have shaped these strategies online, was the attempt at constitutional amendment to allow for re-elections, sought by the incumbent president in the year leading to elections. Both final contenders, Mario Abdo from within the ruling Colorado party, and Efrain Alegre from the opposition, actively opposed these ambitions, forging an unlikely alliance, and taking on the profile, as reported by the media, institutionalists or constitutional defenders. A series of protests would eventually stop the amendment process, after a year-long political crisis that escalated into riots, the burning of congress, and the death of an opposition activist at the hands of the police, in the facilities of the Liberal Party[4]. Their stark opposition led both soon-to-be presidential nominees into becoming the biggest rivals of the incumbent president, and of the amendment project. For Mario Abdo, the confrontation was direct in the context of the Colorado primaries, probably cementing his profile as main opponent.

Later on, however, both candidates had to make concessions to build uneasy alliances. Mario Abdo had to campaign with the incumbent president himself, who after not achieving the amendment, ran for congress and became the head of the party's list for the senate. Efrain Alegre, on his part, had chosen a running mate from an opposition party that supported the amendment a year before. As a result of these alliances, we were expecting both candidates to lose their profile as key rivals to the incumbent president, and the amendment re-election agenda. In fact, Twitter conversations around Mario Abdo's campaign continued to emphasize him at the center, and his platform was still that of a constitutional defender/amendment opponent.

A second event preceding the elections contributed further: one of the main candidates in the list for congress of the Colorado party was accused and arrested on charges of influence peddling more reasons to avoid emphasis on the congress list, and focus on the presidential candidate. Therefore, conversations on Twitter were a reflection of what was happening in the offline campaign trail.

In contrast, the GANAR Alliance ran with the challenge of asserting their presidential figure, who had become prominent thanks to his opposition to the amendment project, while at the same time winning as many votes as possible for its multiple congressional candidate lists, all from different parties and movements. Twitter conversations then were divided among promoting the figure of the candidate and promoting the many political groups that formed the alliance. We can view this, again, as a reflection of what their campaign needs were.

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[4] Paraguay congress set on fire as election protests turn deadly: https://www.bbc.com/news/world-latin-america-39465064.

At the end of the process, the marginal difference between presidential candidates (3.7% in favor of the Colorado party candidate), and the lost of seats in the upper chamber of congress by the Colorado party, could mean that party loyalty might no longer be enough in the future, with social media becoming more prominent as well as more young people become registered voters.

More than ever before, in these elections, candidates needed to gain the attention of other constituencies, which might have shaped Twitter conversations to display another of our key observed behaviors, related to cross-party interactions. An echo-chamber existed around the losing candidate, with most of his cross-party interactions being only between parties of the same alliance, a phenomena that has been seen before in the use of social media for political discourse (Justwan et al. 2018). The winning party profiles followed a different route. Cross-party interactions on this side connected them with profiles that promoted their opposition. This could be a reflection of that need from the Colorado party to engage constituencies from across the aisle, particularly those who might be more likely to turn. It could also be a benefit of running solo: the Colorado party did not have a need to mobilize a diverse set of parties and movements, therefore cross-party interactions could concentrate on either attacking or attracting opponents.

This interesting result opens a new research question around how much of these cross-party interactions could be characterized as troll behavior.

RQ2: What external events influenced the conversation on Twitter?

As we have seen in the results, externals events have apparently influenced the discussion on Twitter. By looking at the evolution of tweets in both elections (Figs. 6, 7), we can see how the number of publications was sustained more consistently during the primary than during the general election. One way to explain this difference is to consider the features of the political context we have mentioned earlier in this article. Due to its long-standing dominance, the primary of the Colorado party concentrated the attention more consistently and there was apparently a general perception that next president would very likely come out of this primary.

In the general election, however, a long period of low activity can be observed after the poll results were published, which offer a second way of explaining the phenomena. In fact, the polls, as shown in our data, were one of the most influential events in Twitter, acting almost as an anesthesia to the online political conversation, with a large period of "radio silence" following their publication, a silence that was only broken a week before the general elections, by a presidential debate not less. Many political actors denounced their negative role, and according to Twitter at least, they do seem to have diminished the level of participation, which can be seen as detrimental to the process.

We understand that the reports of the polls have undermined the enthusiasm of the citizenship in the general election. The reported difference of 31% between the two most popular candidates just 1 month before the polling date might have been perceived by the society as irreversible undermining the enthusiasm of the

citizenship in the general election—note that the final difference in the ballot box was only 3.7% in favor of the winning candidate.

In addition to this event, which occurred during our monitoring period, other events that took place outside of our monitoring period had likely and important indirect influence on Twitter conversations, as we have discussed in relation to our first question. Developing methods to fine-tune our analysis and draw connections to specific events outside of the local timeframe of elections also opens interesting opportunities for our research.

Moreover, we analyzed the network of interactions between users who participated in the conversation about the Paraguayan elections in order to identify influencing actors in the political discourse. The network of interactions confirmed the expected influence of the electoral candidates, especially the presidential aspirants and relevant political actors. However, a surprising result was the importance in the network of non-political actors, such as journalists who work in mainstream media groups. Interestingly, the influence of some of them was even higher than the actual candidates. A detailed analysis of the influencers indicated that the importance of these users was mainly due to the large volume of retweets that concentrated their publications.

RQ3: Which Twitter profiles influenced the discussion in the network?

Finally, but not least, another part of our work was the study of the interactions generated during the electoral discussion. By monitoring both candidates timelines and party-wide or political-movement-wide hashtags as they were used by non-candidates, our work went beyond previous work, which was either focused on candidates' or conversations among other users, but not both. Moreover, social network analysis was also performed to understand the structure of the networks of influence. As opposed to some of these previous works that studied social influence (Casero-Ripollés 2021), here we discovered that the most predominant profiles were mainly well-known journalists with a large number of followers, beside the candidates themselves, a pattern that repeated in both primaries and the general election. This is, in many ways, a reflection of our current political culture. Journalists and media personalities have a strong influence on the opinions that are expressed in social media, and apparently it translated to the political process as well. Another reason for this could be connected to the importance of external events in how influential are political actors, as described by Casero-Ripollés et al. (2021). Indeed, most of the journalists we identified as influential adopted clear and strong positions during some of those external events, allowing them to gain visibility and amass an important following.

To sum up our discussion, there is no evidence that Twitter conversations had some form of influence on electoral results, but a common thread in the answers to all of our questions is that our data shows how the opposite occurred: how the offline campaign strategies, needs, and behaviors were reflected, in interesting details, in the online world of Twitter. This also opens challenging new opportunities for

analysis of online political conversations and their connection to needs and practices of the offline campaign trail.

Limitations and future works

The study has several limitations. Our data collection efforts were based on monitoring a white-list of hashtags and user accounts (i.e., keywords). Thus we did not capture the many tweets that may have been related to the discussion, but that did not contain the keywords. The risk of having a white-list of keywords is that we may have missed important keywords because we were not aware of them when creating the white-list. As mentioned before, we minimize this risk by partnering with the local NGO Tedic, expert in digital rights and politics, to oversee our dataset of keywords and make sure it was as exhaustive as possible.

From a technical point of view, our data infrastructure had problems that caused it to break often when under stress. To minimize the impact of this, our algorithms would always go through all the tweets produced in a week, even those already stored on a previous iteration. We would then only store the ones we did not save in a previous iteration. In other words, we paid multiple visits to the tweets of a week, every time we launched our script after being alerted of a break. Limitations in our storing and computational resources prevented us from employing Twitter's Streaming API, which gets access to a live stream of all relevant tweets. Instead, we decided to use Twitter's Search API. We recognize that this decision, based on the computational resources we had at hand, disallowed us to collect larger volumes of tweets.

The study focuses solely on Twitter, however, a very large part of the social media discourse happened on Facebook and WhatsApp, channels with very restrict privacy policies, which hinders our ability to access the data generated during election processes. That said, some studies have already looked into these other platforms (Lupu et al. 2020; Nemer 2021; Hedman et al. 2018; Sandoval-Almazan and Valle-Cruz 2018) and may serve as a model approach. Additionally, we identified the presence of cross-party/movement profiles, but we did not study the content of their publications to understand the type of content they generated in their interactions with supporters of other political groups. Related to this, we did not study the tone of the tweets that contained campaign hashtags to confirm that these publications were actually used to promote candidacies. We see an interesting opportunity here, to study whether trolls and bots existed and played a role in these conversations.

We have begun to analyze the network of interactions between users who participated in the conversation about the Paraguayan elections in order to identify influencing actors in the political discourse. Although, our preliminary results unveil the significant importance in the network of an expected actors, such as journalists, the analysis still needs further exploration to be ready for publication.

In fact, as part of our future research, we have started to work on a toolset to detect and analyze the behavior of bots, fake accounts, and trolls. The toolset we developed to collect and analyze Twitter conversations around elections already include some experimental algorithms to detect this type of profiles. The approach

we started with was based on heuristics, analyzing if and when Twitter users presented a list of common characteristics associated with bots and fake accounts in literature, but we plan to expand this toolset with machine learning based techniques. Moreover, our toolset is open source and already prepared to be applied to other electoral processes, or even other themes of discussion in Twitter.

Conclusion

In conclusion, our results show consistency in the use of Twitter in Paraguay before, during and after both primaries and general election. It is hard to measure how much these online conversations influenced the final result. Our analysis shows, instead, how the events that happened before, during and after the elections, ended up shaping Twitter conversations. In a nutshell, the conversation on Twitter certainly did not correlate with the electoral results, but it does seem to signal what the needs of the different groups are in the campaign trail, opening a window into the different political strategies as they emerge in the electoral process. In many ways, Twitter was a good mirror of the different political strategies followed by the supporters of each candidate, even despite the fact that Twitter users represent only a modest portion of the electorate.

Our results challenge previous studies that suggest there is a relationship between social media usage and voting outcome and complement investigations that found no association between the candidates' social media presence and their electoral performance. Also, they provide insights regarding social media influencers in times of elections, a topic that have been scarcely studied in the region of Latin America. Finally, the study approaches the topic in a comprehensive fashion, questioning (i) the association between electoral discussions on Twitter and the election outcome; (ii) how external events' affect electoral conversations on Twitter; and (iii) who influence the social media sphere during a national election.

Declarations

Conflict of interest The authors declare that they have no competing interests.

Ethical approval Not applicable.

Consent to participate Not applicable.

Consent for publication Not applicable.

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