

Asymmetric Polarization on Twitter and the 2018 Brazilian Presidential Elections

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ABSTRACT

This study aims to understand the dynamics of polarization and how news outlets influenced political discussions on Twitter during the 2018 Brazilian presidential campaign. We analyze four datasets using social network analysis. Our main finding is the identification of an asymmetric polarization.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing** → *Collaborative and social computing theory, concepts and paradigms* → Social networks

KEYWORDS

Asymmetric polarization, echo chambers, journalism, political polarization, social network analysis

ACM Reference format:

Felipe B. Soares, Raquel Recuero and Gabriela Zago. 2019. Asymmetric Polarization on Twitter and the 2018 Brazilian Presidential Elections. In *Proceedings of the International Conference on Social Media & Society*, Toronto, Canada (SMSociety). DOI: 10.1145/3328529.3328546

1 INTRODUCTION

During the 2018 Presidential Elections, Brazil faced one of the most controversial political periods in its history. The far-right politician Jair Bolsonaro, from the Liberal Social Party (PSL), was elected with the majority of votes.

Bolsonaro is known for his controversial positions, especially regarding women, homosexuality and human rights¹. Also, Bolsonaro's campaign was accused of disseminating false information during the run² through social media channels.

Brazilian political polarization has grown since Dilma Rousseff's impeachment in 2016 [24], ending 16 years of Workers' Party (PT) government. Rousseff's impeachment marked the ascension of new conservative groups in the country, particularly the far-right, which strongly supported the impeachment [17]. This also increased an anti-left movement among Brazilians, particularly against the Workers' Party. Further, in 2018, the former-president Lula da Silva (2003-2010), one of the most popular leaders of the left, was arrested following a conviction of corruption, fueling the polarization between left and right-wings.

Lula da Silva was the Workers' Party candidate for the 2018 presidential election and the leader in the polls. However, due to his conviction, he was not allowed to run, and his vice-president candidate, Fernando Haddad, stepped up. Bolsonaro's campaign used the anti-Workers' Party sentiment as a main strategy in the election, which reinforced the political polarization. Bolsonaro received 46% of the votes in the first round and Haddad received 29%; then both disputed a runoff, won by Bolsonaro with 55% of the votes.

After his election, many international news outlets began referring to Bolsonaro as Tropical Trump or Trump of the Tropics³. The main reason for the comparison is their

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SMSociety '19, July 19–21, 2019, Toronto, ON, Canada
© 2019 Association for Computing Machinery.
ACM ISBN 978-1-4503-6651-9/19/07...\$15.00
<https://doi.org/10.1145/3328529.3328546>

¹ See <https://www.theguardian.com/world/2018/sep/06/jair-bolsonaro-brazil-tropical-trump-who-hankers-for-days-of-dictatorship>.

² See <https://www.theguardian.com/world/2018/oct/10/brazil-fake-news-presidential-election-whatsapp-facebook>.

³ See <https://www.telegraph.co.uk/news/2018/10/29/brazils-president-elect-jair-bolsonaro-really-trump-tropics/> and <https://www.theguardian.com/world/2018/apr/19/jair-bolsonaro-brazil-presidential-candidate-trump-parallels>.

controversial opinions, but they share other characteristics as well. One of them is that both presidents frequently criticize and harass mainstream media and journalists who are not sympathetic to them and give preference to right-wing partisan media and social media when giving interviews and announcing political decisions⁴.

Benkler, Faris and Roberts [4] analyzed the media diet during elections and the first year of Trump's government and found no symmetry between Trump supporters and the rest of the Americans on social media. Partisan outlets were more central to the right-wing media ecosystem, while the left-wing was more diverse. Thus, while left-wing network had more access to diverse information, right-wing was more centralized on hyperpartisan information, creating a polarization between right-wing media and the rest of the media. Our hypothesis is that a similar phenomenon occurred during Brazilian elections.

In this paper, we analyze four political conversations in key moments of the election run. Our data was extracted from the Twitter API. For this discussion, we will use social network analysis (SNA) to understand the structure of the conversations and thus, discuss the role of the media outlets and the most important nodes for the discussion. Our research questions are: (1) which dynamic of polarization characterized the political discussions on Twitter during Brazilian presidential elections? And (2) which outlets influenced the political conversation in this period?

2 POLITICAL POLARIZATION AND ASYMMETRIC POLARIZATION

2.1 Political Polarization and Echo Chambers

In the past few years research has showed evidences of the presence of political polarization in online conversations, [3, 4, 11, 12, 23] including in the Brazilian context [1, 22, 24]. In conversations on social media, the polarization normally creates a network structure called "polarized crowds" [12, 23]. The polarized crowds are networks characterized by the presence of two opposing groups with a high density and with nodes tightly connected to each other.

Polarized groups are often connected to the rise of echo chambers [26]. Echo chambers happen when homophilic groups isolate themselves from other groups with different ideas, actively limiting the circulation of diverse content. In echo chambers, individuals only get engaged in discussions that reinforce their own points of view and become less receptive to different ideas. In fact, when exposure to opposing occurs, it serves to further increase the isolation of echo chambers [2].

Some authors state that the algorithms for social filtering in social network sites create or strongly increase

the presence of echo chambers [18, 27]. Although these algorithms influence the creation of a more comfortable experience for users – and by doing so, they reinforce their current points of view – social filtering is not the main culprit in the existence of the phenomenon [4, 24].

Echo chambers are so prevalent that they have been identified even in contexts where social media was not relevant [26]. However, in online conversations, users are often highly active in the formation of echo chambers [24], engaging themselves in sharing and posting content which they agree with. Because some of these users play different roles in the social network, their actions may influence the whole information diffusion among the group.

2.2 Influencers and Motivated Reasoning

In general, influencers are political leaders or experts in a particular area and they have the ability or authority to convince individuals to change or accept an idea or behavior [6, 9, 14, 24]. Previous research identified three types of influencers in polarized groups in political conversations on Twitter [24]: opinion leaders, informational influencers and activists. While the first two categories are connected to users with a higher visibility in the network, activists are highly active users. These influencers manage to better influence the network by acting together. The opinion leaders shape the views of the other users, by being strongly replicated by the activists – which, in turn, only share like-minded content, reinforcing the homophily of the group. The informational influencers are media outlets frequently dragged inside the groups based on the users' perception of their messages [1, 21].

The structure of how influencers act in political discussions is relevant to this research because they actively increase the gap between echo chambers. By doing so, they provide a context of support for biased information when it is favorable for the group's position [26]. This behavior could be associated with motivated reasoning.

Motivated reasoning studies contend that individuals may have their reasoning affected by motivation [13]. Thus, one might reason through a biased cognitive process to evaluate evidence and form impressions or beliefs based on what one considers most appropriate, yielding a desired conclusion. In this process, individuals tend to maintain an illusion of objectivity and try to logically justify the desired conclusion. Even when one seeks for confirmation of a desired conclusion, within an echo chamber the like-minded opinion leaders and activists tend to reinforce the biased conclusion if it is favorable for the group narrative. Soon & Goh [25] explain that this movement often creates a perception of "false consensus" among the group. Also, the messages of informational influencers might be evaluated based on the biased beliefs of the echo chamber,

⁴ See <https://www1.folha.uol.com.br/internacional/en/world/2018/12/the-tropical-trump-bolsonaro-follows-closely-the-us-presidents-style.shtml>.

when deciding which media outlets are dragged or not to a group. This process is associated with the group's media diet and it might be also associated with the idea of asymmetric polarization, which we will further discuss.

2.3 Asymmetric Polarization

The visibility given to media outlets inside polarized groups may be linked to the group's beliefs and to the presence of echo chambers. A biased diet of information may also be an impulse for motivated reasoning, especially when based on partisan media. Further, these characteristics of echo chambers with biased reasoning are very likely to create a perfect environment for disinformation, with intentional manipulation of information for political purposes [4].

In this study, we consider partisan media distinct from mainstream media and alternative media. Benkler, Faris & Roberts [4] define partisan media as those that were clearly engaged in political campaigns and do not necessarily follow norms of professional journalism [4]. We adopt this concept of partisan media in our analysis. We consider as mainstream media those mass news outlets with more tradition in journalism. We consider as alternative media the smaller outlets that provide alternative perspectives. While partisan media helps to spread disinformation [4], mainstream and alternative media do not engage in that.

Benkler, Faris & Roberts [4] analyzed the media diet ecosystem on social media in United States during presidential election in 2016 and Trump's first year in 2017. During this period, they identified two different groups of actors, one more connected to the right, and the other, to the left. The left-wing group frequently gave visibility to center and left mainstream media. On the other hand, the right-wing group emphasized almost only right-oriented media, further creating a radicalization pattern within the group, where more and more far-right biased information was shared. Therefore, there was no left-right polarization, but instead a division between the right and the rest of the media. They called this phenomenon "asymmetric polarization".

In the right-wing group, many media outlets emphasized partisan content over news disseminated by mainstream media. Further, in some cases these partisan media even stated that other media outlets that contradicted and disproved these biased news pieces were not trustworthy. The authors called this dynamic "propaganda feedback loop", because it creates an environment where media, politicians, activists, and other participants create a self-reinforcing feedback loop [4]. This also may increase practices such as firehosing, when real information perceived as bad for a candidate is fought through the massive spread of false information [19].

This phenomenon can have negative effects on democracy and political participation, as polarization and disinformation increases [8, 15, 20]. Thus, understanding the political conversations and media diet of different groups is key to discuss social media effects on democracy.

In this work we will analyze the scenario of political conversations on Twitter and try to identify patterns of polarization. Our goal is to understand (1) which polarization dynamic political discussions on Twitter during Brazilian presidential elections followed and (2) which outlets influenced the political conversation in this period. We will also discuss how media diet might have influenced Brazilian elections and how it may affect Brazilian democracy.

3 METHODS

3.1 Data Collection

We used Social Feed Manager⁵ to collect tweets that contained the keywords "Bolsonaro" or "Haddad" (the two front runners) during September and October of 2018 (the period of Brazilian presidential election). Data collection was done on a daily basis, once per hour. From this original dataset, we filtered four datasets we will use to analyze the conversations during key dates of the campaign per date.

We analyze data from: 1) September 11th (first round – keyword "Haddad"), when Haddad was selected as Lula da Silva substitute as Workers' Party candidate; 2) September 28th (first round – keyword "Bolsonaro"), when Bolsonaro's ex-wife was interviewed by *Veja* (a Brazilian magazine) and accused him of concealment of property and other crimes; 3) October 27th (second round – Keyword "Bolsonaro"), one day before the runoff; and 4) also October 27th (second round – Keyword "Haddad").

We decided to analyze October 27th because it was a "neutral" day on the run, while the other two dates were selected because one of the candidates was involved in breaking news of the day. By doing so, we are able to examine two distinct contexts and come to a more fulsome conclusion. We did not select a day with negative breaking news about Haddad because there was none during the campaign – negative news articles about him were false and not disseminated by mainstream media.

For this work, we intend to focus on the structure of the networks to expose polarization and influencers and thus, will use Social Network Analysis (SNA) [7, 28]. SNA is useful because it allows us to identify groups in the conversations, and further observe the position of the news outlets within those groups. As we are looking at political conversations on Twitter, each node represents an individual Twitter account and each connection, a mention or a retweet.

⁵ <https://library.gwu.edu/scholarly-technology-group/social-feed-manager>.

We will work with two metrics: modularity and indegree. Modularity is used to identify groups in social networks. The higher the modularity, the denser are the connections within a module and the less dense the connections are with other groups [5, 16]. In this analysis, we used modularity to identify the groups in Twitter political conversations. Indegree is a metric that shows how many connections a certain node receives in the network [10]. A connection in our network represents a mention or a retweet of a node's tweet. Thus, actors with high indegree are those with higher visibility in the conversation. Table 1 provides a breakdown of the data collected.

Table 1: Datasets.

Date	Keyword	Nodes	Tweets	Modularity
Sep. 11 th	Haddad	118,903	264,189	0.518
Sep. 28 th	Bolsonaro	159,991	423,314	0.504
Oct. 27 th	Bolsonaro	285,800	628,516	0.543
Oct. 27 th	Haddad	296,946	648,839	0.531

In order to investigate the presence of an asymmetric polarization, we first identified the different clusters involved in each dataset and their ideological focus. We further analyzed news outlets with the top indegree in each network, and the module they belonged to. Then, we classified the news outlets according to their political position (left, right or center) and the type of content they circulated more (mainstream, alternative or partisan, as defined in section 2.3).

We decided to analyze 20 news outlets because they are the most influential news outlets in the network. Also, we considered the entire network (and not each group separately) because this strategy would make it easier to identify asymmetric polarization, if it exists. We further qualitatively examined the most retweeted tweets from each outlet, in order to understand the type of information that circulates in each cluster.

We named the modules “pro Bolsonaro” and “anti Bolsonaro” because the pro group is highly centered on him, while the anti group is not necessarily centered on one politician, even though it has some centrality to Haddad on some dates. Also, there was a strong anti Bolsonaro sentiment during Brazilian election and that is reflected in our datasets.

4 RESULTS AND DISCUSSION

All the analyzed networks have similar structures, with two main groups tightly connected (Figures 1-4) and a high modularity (Table 1). This means the conversations led to a polarized structure similar to polarized crowds [12, 23].

In all graphs, the green group represents the anti Bolsonaro discourse and the fuchsia module is pro Bolsonaro. In all the networks, the anti Bolsonaro group

was larger (more users) than the pro Bolsonaro group. Below we provide a general description of each of the networks we analyzed.

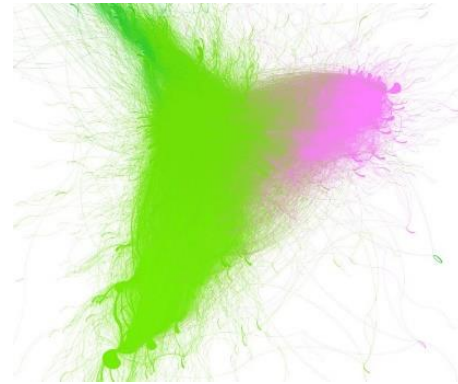


Figure 1: Haddad, Sep. 11th.

On September 11th Haddad was announced as Lula da Silva's substitute as the Workers' Party candidate after the Supreme Court barred Lula. This is the only network analyzed in which the green module is highly centered on a pro Haddad sentiment (rather than an anti Bolsonaro). Lula da Silva, Haddad, Manuela D'Ávila (Haddad's running mate) and the Workers' Party are among the users with higher indegree.

The fuchsia group is centered in a pro Bolsonaro sentiment. Danilo Gentili, a humorist and television host who supported Bolsonaro on the run, was the node with highest indegree. Bolsonaro himself is not central in the group, but many of his supporters are among the users with higher indegree.

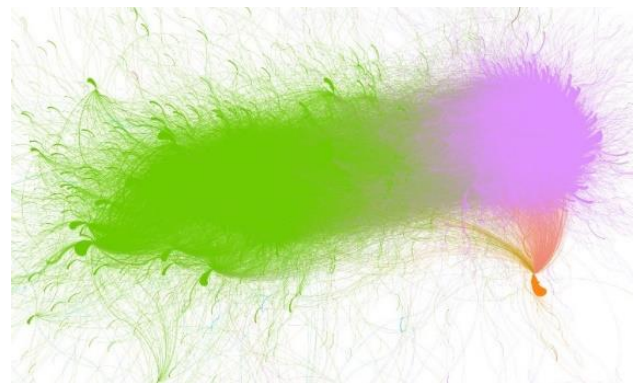


Figure 2: Bolsonaro, Sep. 28th.

On September 28th, the Brazilian magazine *Veja* published a polemic interview with Bolsonaro's ex-wife. In this interview, she accused him of concealment of property and other crimes.

The anti Bolsonaro group is especially heterogeneous. The first round of Brazilian election was in October 7th, so in September 28th there were still 13 candidates in the running. Some of them appear among the users in the green module. Ciro Gomes (a candidate that received 12% of the votes in the first round) was the one with a higher indegree, followed by Geraldo Alckmin (4.76% of the votes) and Guilherme Boulos (0.58% of the votes). Ciro Gomes was associated with a center-left political position, while Geraldo Alckmin was associated with a center-right position and Guilherme Boulos was associated with a left position. Manuela D'Ávila, also appeared in the group, although Haddad himself had little visibility. This further establishes that the green module does not represent a “pro Haddad” position, but rather an “anti Bolsonaro” position.

The fuchsia module gave a high visibility for the musician Roger Moreira, who supported Bolsonaro on the run. Also, Bolsonaro himself and his three politician sons, Eduardo, Flavio, and Carlos, are some of the main users in the group. This shows a high association of the module with Bolsonaro.

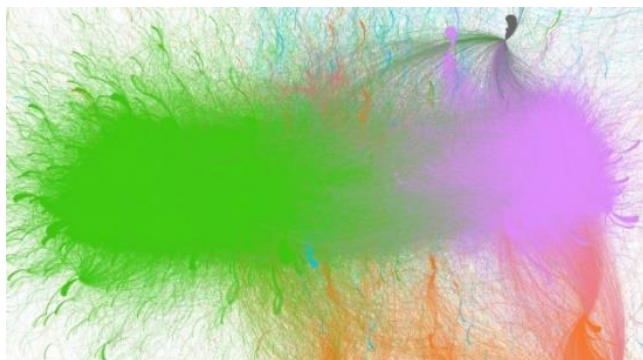


Figure 3: Bolsonaro, Oct. 27th.

We decided to include October 27th because it was a more neutral day during the campaigns, with no candidate-specific news – the runoff was on October 28th. Nevertheless, we found a polarized network very similar to the others.

Joaquim Barbosa, a former Brazilian Chief Justice who sent to jail some of the Workers' Party leaders for corruption, declared his vote for Haddad and criticized Bolsonaro's anti-democratic views. This made Barbosa the user with the highest visibility in the anti Bolsonaro module (green), followed by Haddad himself. Felipe Neto, a popular Brazilian YouTube star, who also criticized Bolsonaro and declared his vote for Haddad, had high centrality as well. The green module had a strong anti Bolsonaro sentiment, more than a pro Haddad position.

The fuchsia group kept its characteristics compared to September 28th, with Bolsonaro as the user with a higher

indegree. His son Flavio also received high visibility, among other Bolsonaro supporters.

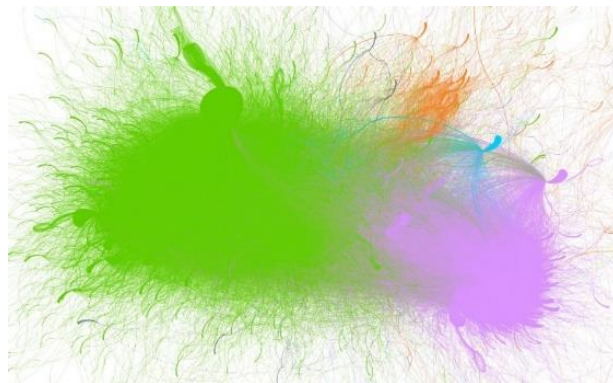


Figure 4: Haddad, Oct. 27th.

The network of October 27th collected using “Haddad” as keyword is very similar to the one with the keyword “Bolsonaro” (Figure 3). Once again, Joaquim Barbosa is the node with higher indegree within the anti Bolsonaro group (green), followed by Haddad and Felipe Neto. It shows that even when “Haddad” is used as keyword during the runoff there was a strong anti Bolsonaro sentiment in the green module. The pro Bolsonaro module (fuchsia) is centered in Bolsonaro himself as the user with highest indegree, followed by other politicians who supported him.

The pattern found in all four datasets indicates that the main polarization during Brazilian presidential elections was between Bolsonaro and the rest of the candidates. As seen on September 28th, for example, there was a very heterogeneous environment in the green module. On the other hand, the fuchsia module was centered in a pro Bolsonaro discourse along all four datasets. It is similar to what have been found by Benkler, Faris and Roberts [4] in the US scenario.

4.1 Mapping News Outlets

We identified the 20 news outlets with highest indegree in each of the four networks and qualitatively examined their accounts. Then, we mapped the module they belong to. Finally, we categorized them as mainstream media, partisan media, and alternative media (as defined in section 2.3), and according to their political position (left, right, or center). We also identified the most retweeted tweet from each outlet to further examine how the retweeting behavior is connected to the content of the tweet.

September 11th was the day Workers' Party announced Haddad as Lula da Silva substitute. Among the four networks we analyzed, this is the least biased media diet in the pro Bolsonaro group (Table 2). Despite of it, we found in this group three right-wing news outlets and two of them were identified as partisan media. Veja, the news

outlet with higher indegree in the Pro Bolsonaro group, historically criticized the Workers' Party and is identified as an anti-left-wing magazine. Among the most retweeted tweets of these news outlets, some of them mentioned polls favorable to Bolsonaro and unfavorable to Haddad. Veja tweeted: "Datafolha: On the second round, Bolsonaro is defeated by everyone, except by Haddad⁶"; and G1: "Ibope Poll: Bolsonaro, 26%; Ciro, 11%; Marina, 9%; Alckmin, 9%; Haddad, 8%". While these tweets are factual, they point to Haddad's disadvantage in the polls. There was also more poignant negative news about Haddad, such as in this tweet from O Antagonista: "Lula will set up Haddad's ministry"⁷ and from G1 Política: "Marina says Haddad is 'similar' to Dilma and voting for an 'heir' can take Brazil to 'rock bottom'⁸". Both tweets make reference to the fact that Haddad was portrayed both by the Worker's Party and the opposition as Lula's heir. However, while the Worker's Party tried to use this as an advantage (because of Lula's popularity), the opposition framed Haddad as a puppet.

Among anti Bolsonaro users (Table 3) we found a majority of mainstream media, although many of them are left-wing vehicles. This happened because the center mainstream media focused more on the announcement, for example: UOL Notícias: "Worker's Party Leadership approves Haddad's name as the new party candidate to the presidency #UOLintheballots"⁹. Left-wing outlets also demonstrated their support to the candidate: Carta Capital: "Carta Capital, following the tradition of publications from Europe and USA, supported both Lula and Dilma on their elections. From now on, we will support Fernando Haddad, Lula's and our candidate. Read the editorial by Mino Carta"¹⁰. As mentioned before, this is the only network where there is a pro Haddad sentiment within the green group, rather an anti Bolsonaro. It is caused by the political context (it was still the first round) and the news agenda of the day (Haddad as the new Workers' Party candidate).

Table 2: "Haddad", Sep. 11th, Pro Bolsonaro

News outlets	Type	Position	Indegree
Veja	Mainstream	Right	997
O Antagonista	Partisan	Right	620
G1	Mainstream	Center	545
Estadão	Mainstream	Center	490
G1 Política	Mainstream	Center	417
UOL	Mainstream	Center	302
Conexão Política	Partisan	Right	266

⁶ Translated from Portuguese: "No Segundo turno, Bolsonaro é derrotado por todos, menos por Haddad".

⁷ Translated from Portuguese: "Lula vai montar o ministério de Haddad".

⁸ Translated from Portuguese: "Marina diz que Haddad é 'semelhante' a Dilma e que votar em 'indicado' pode levar Brasil ao 'poço sem fundo'".

⁹ Translated from Portuguese: "Executiva do PT aprova nome de Haddad como novo candidato à Presidência #UOLnasUrnas".

¹⁰ Translated from Portuguese: "CartaCapital, conforme tradição de publicações da Europa e EUA, apoiou as duas candidaturas de Lula e de

Table 3: "Haddad", Sep. 11th, Anti Bolsonaro

News outlets	Type	Position	Indegree
Folha de S. Paulo	Mainstream	Center	1,835
Carta Capital	Mainstream	Left	1,412
Brasil 247	Partisan	Left	1,353
Diário do Centro do Mundo	Partisan	Left	932
UOL Notícias	Mainstream	Center	835
Jornalistas Livres	Alternative	Left	737
El País Brasil	Mainstream	Left	710
Brasil de Fato	Alternative	Left	589
Revista Fórum	Mainstream	Left	560
O Globo	Mainstream	Center	484
Folha Poder	Mainstream	Center	422
Catraca Livre	Alternative	Left	386
The Intercept Brasil	Alternative	Left	298

On the September 28th dataset, Veja was the news outlet with the highest indegree (it was also the node with the highest indegree considering all types of users). This was expected, considering that Veja interviewed Bolsonaro's ex-wife, where she accused him of several crimes (the main news event of the date, and the reason we selected this date to be part of our research). Veja appeared in the anti Bolsonaro group (Table 5) along with many other mainstream news outlets, most of them with no clear political position (classified as center). Most of them reverberate Veja's breaking news. Veja tweeted: "EXCLUSIVE: In a legal process of more than 500 pages to which Veja had access, Bolsonaro's ex-wife accuses him of stealing a vault, hiding his assets, receiving non-declared payments, and acting with 'unlimited aggressiveness'¹¹"; while Folha de S. Paulo tweeted: "Ex-wife accuses Bolsonaro of stealing vault, and aggressiveness¹²". In both cases, the cluster gives visibility to the scandal, and how badly it portrayed Bolsonaro.

Among the 20 top indegree news outlets on September 28th, only four are within the pro Bolsonaro group (Table 4). All of them are partisan media that supported him on the run. This shows an extreme biased media diet among Bolsonaro's supporters. Also, in their most retweeted tweets these partisan media criticized mainstream media and said the breaking news about Bolsonaro's ex-wife was not trustworthy, similarly to what have been found by Benkler, Faris and Roberts [4]. Politiz Oficial tweeted: "Good morning Brazilians! Today, at dawn, we published the information exclusively: The Abril Publishing was responsible for reopening a family lawsuit involving

Dilma. A partir desta edição apoiamos Fernando Haddad, candidato de Lula e nosso". Leia editorial de Mino Carta".

¹¹ Translated from Portuguese: "EXCLUSIVO: Em um processo de mais de 500 páginas, às quais VEJA teve acesso, ex-mulher acusa Bolsonaro de furtar cofre, ocultar patrimônio, receber pagamentos não declarados e agir com 'desmedida agressividade'".

¹² Translated from Portuguese: "Ex-mulher acusou Bolsonaro de furto de cofre e agressividade".

Bolsonaro and his ex-wife. Bolsonaro WASN'T THE DEFENDANT. He was the AUTHOR of the lawsuit against her. Share!¹³; and Conexão Política tweeted: "BREAKING NEWS: VEJA X Bolsonaro: the sensationalism behind a lawsuit about alimony and child custody¹⁴".

Table 4: "Bolsonaro", Sep. 28th, Pro Bolsonaro

News outlets	Type	Position	Indegree
Renova Mídia	Partisan	Right	3,437
Politz Oficial	Partisan	Right	2,300
Conexão Política	Partisan	Right	2,291
O Antagonista	Partisan	Right	1,689

Table 5: "Bolsonaro", Sep. 28th, Anti Bolsonaro

News outlets	Type	Position	Indegree
Veja	Mainstream	Right	10,915
Folha de S. Paulo	Mainstream	Center	2,939
Mídia NINJA	Alternative	Left	1,954
Revista Época	Mainstream	Center	1,909
Estadão	Mainstream	Center	1,765
Revista Exame	Mainstream	Center	1,633
G1	Mainstream	Center	1,069
UOL	Mainstream	Center	942
Diário do Centro do Mundo	Partisan	Left	911
UOL Notícias	Mainstream	Center	735
Brasil 247	Partisan	Left	689
Carta Capital	Mainstream	Left	598
Jota.Info	Mainstream	Center	472
InfoMoney	Mainstream	Center	451
O Globo	Mainstream	Center	402
BuzzFeed News Brasil	Mainstream	Center	373

October 27th was considered a "neutral" day – there was no breaking news about any candidate. Nevertheless, the Pro Bolsonaro module in the network with "Bolsonaro" as keyword (Table 6) had less news outlets among the top 20 indegree and is once again centered on right-wing partisan media. This means that the biased media diet was not caused by negative news about Bolsonaro, rather, it represented ordinary behavior throughout the run. Mainstream outlets only appear among those with top indegree because their messages are positive for Bolsonaro. For example, Estadão tweeted: "Bolsonaro will set the tone for a pacified country", says Doria¹⁵¹⁶; and Veja tweeted:

"Euphoria with Bolsonaro takes US dollar to the lowest price since May¹⁷".

The anti Bolsonaro group (Table 7) shows a wider variety of news outlets, including many mainstream media. Even The Economist appears among anti Bolsonaro users because the British magazine criticized the then-candidate. The Economist tweeted: "If Jair Bolsonaro wins Brazil's election, the survival of democracy in Latin America's largest country could be put at risk". There were also some tweets about anti Bolsonaro demonstrations, such as in tweets from Folha de S. Paulo: "Roger Waters protests against Bolsonaro within the legal time¹⁸¹⁹"; and Mídia NINJA: "Why not Bolsonaro? See the words of @emicida²⁰²¹".

Table 6: "Bolsonaro", Oct. 27th, Pro Bolsonaro

News outlets	Type	Position	Indegree
O Antagonista	Partisan	Right	2,335
Conexão Política	Partisan	Right	2,302
Estadão	Mainstream	Center	2,288
Renova Mídia	Partisan	Right	2,234
Veja	Mainstream	Right	1,859
Revista Exame	Mainstream	Center	1,741
G1	Mainstream	Center	920

Table 7: "Bolsonaro", Oct. 27th, Anti Bolsonaro

News outlets	Type	Position	Indegree
Folha de S. Paulo	Mainstream	Center	4,673
Mídia NINJA	Alternative	Left	3,515
UOL Notícias	Mainstream	Center	2,288
O Globo	Mainstream	Center	2,115
Brasil 247	Partisan	Left	1,588
Jornalistas Livres	Alternative	Left	1,514
Diário do Centro do Mundo	Partisan	Left	1,174
The Economist	Mainstream	Right	1,168
UOL	Mainstream	Center	839
Revista Fórum	Mainstream	Left	814
Congresso em Foco	Mainstream	Center	753
Carta Capital	Mainstream	Left	749
El País Brasil	Mainstream	Left	726

Both networks from October 27th had similar results. On the one using "Haddad" as keyword, the pro Bolsonaro module (Table 8) gave more visibility to Veja, but three partisan media are among top 5 indegree news outlets.

¹³ Translated from Portuguese: "Bom dia brasileiros! Hoje na madrugada publicamos a informação com exclusividade: A Editora Abril foi a responsável pelo desarquivamento do processo familiar de Bolsonaro e sua ex-esposa. Bolsonaro NÃO ERA RÉU no processo. Ele foi o AUTOR da ação contra ela. Divulguem!".

¹⁴ Translated from Portuguese: ÚLTIMAS: VEJA X Bolsonaro: o sensacionalismo por trás de um processo de pensão alimentícia e guarda"

¹⁵ Doria is a right-wing politician and supported Bolsonaro candidature.

¹⁶ Translated from Portuguese: Estadão: "Bolsonaro é quem dará o tom de um país pacificado", diz Doria".

¹⁷ Translated from Portuguese: "Euforia com Bolsonaro leva dólar a menor cotação desde maio".

¹⁸ The musician Roger Waters criticized Bolsonaro in his shows in Brazil, calling the politician a neo-fascist. See: <https://www.theguardian.com/music/2018/oct/10/roger-waters-jair-bolsonaro-brazil-concert>.

¹⁹ Translated from Portuguese: "Roger Waters se manifesta contra Bolsonaro dentro do horário permitido por lei"

²⁰ Brazilian musician.

²¹ Translated from Portuguese: "Por que Bolsonaro não? Com a palavra, @emicida!".

Once again, there is a majority of right-wing vehicles. Veja and the partisan media O Antagonista mentioned a Brazilian musician that asked Haddad to delete a video of supporting him that happened to use one of her songs. Veja tweeted: “Paula Toller asks to delete videos of support to Haddad with Kid Abelha²²”. O Antagonista tweeted: “Electoral Supreme Court orders shut down of supporter’s video for Haddad that uses music from Paula Toller²³”. There were other negative news for Haddad, such as in the O Globo Política tweet: “Regional Electoral Court opens investigation about irregular support from Paraíba government to @Haddad_Fernando²⁴”; and Renova Mídia tweeted: “The Brazilian Bar Association published a note with three other entities denying Haddad’s claim²⁵ and explaining they didn’t officially support any of the candidates²⁶”. Once again, mainstream media only had centrality among pro Bolsonaro users because their news supported the pro Bolsonaro narrative.

Within the anti Bolsonaro module (Table 9), there is a majority of mainstream media and a balance between center and left vehicles. Among the top five, four of them are mainstream media and three do not express a political position – including Folha de S. Paulo and O Globo, two traditional news outlets in Brazil. Many news outlets reverberate Joaquim Barbosa’s (the node with highest indegree in the network) message. Folha de S. Paulo tweeted: “Joaquim Barbosa, ex-president of the Supreme Court, declares vote for Haddad²⁷”. Some news outlets also mention other Brazilian public figures, such as the journalist Marcelo Tas and the musician Paulinho da Viola, as in Brasil 247’s tweet: “Workers’ Party’s critic, Marcelo Tas declares his vote for Haddad²⁸ and Revista Fórum’s: “Paulinho da Viola declares vote for Haddad: ‘Black lives are not measured in arrobas²⁹, they are measured in song beats, verses³⁰”.

Table 8: “Haddad”, Oct. 27th, Pro Bolsonaro

News outlets	Type	Position	Indegree
Veja	Mainstream	Right	1,973
O Globo Política	Mainstream	Center	1,930
O Antagonista	Partisan	Right	1,917
Renova Mídia	Partisan	Right	1,572
Conexão Política	Partisan	Right	1,226
G1	Mainstream	Center	1,054
Revista Istoé	Mainstream	Center	555

²² Translated from Portuguese: “Paula Toller pede exclusão de vídeos de apoio a Haddad com Kid Abelha”.

²³ Translated from Portuguese: “TRE manda retirar vídeo de apoio a Haddad que usa música de Paula Toller”.

²⁴ Translated from Portuguese: “TSE abre investigação sobre suposto apoio irregular do governo da Paraíba a Haddad”.

²⁵ Workers’ Party mentioned on their campaign website that the Brazilian Bar Association supported Haddad on the run.

²⁶ Translated from Portuguese: “Ordem dos Advogados do Brasil (OAB) divulgou nota em conjunto com outras três entidades desmentindo a

Table 9: “Haddad”, Oct. 27th, Anti Bolsonaro

News outlets	Type	Position	Indegree
Folha de S. Paulo	Mainstream	Center	5,547
O Globo	Mainstream	Center	3,843
Brasil 247	Partisan	Left	2,804
Revista Fórum	Mainstream	Left	2,440
UOL Notícias	Mainstream	Center	2,111
Diário do Centro do Mundo	Partisan	Left	2,052
Estadão	Mainstream	Center	1,677
Jornalistas Livres	Alternative	Left	1,627
Mídia NINJA	Alternative	Left	1,244
Carta Capital	Mainstream	Left	1,148
Revista Exame	Mainstream	Center	920
Jornal do Brasil	Mainstream	Center	750
Brasil de Fato	Mainstream	Left	614

All four datasets follow the same pattern. In all of them, the anti Bolsonaro group had more news outlets in number among the top 20 indegree. Also, the same group had stronger presence of mainstream media, while partisan media had higher centrality in the pro Bolsonaro group. The indegree of the media outlets is also considerably higher in the anti Bolsonaro module – meaning that media outlets have higher centrality within these groups. These characteristics suggest that anti Bolsonaro users gave visibility to a wider variety of media outlets, maintaining more diverse media diet than those pro Bolsonaro.

4.2 Discussion

In this work we analyzed four Twitter networks associated with the 2018 Brazilian presidential elections. As we highlighted above, in all four datasets the “anti Bolsonaro” group had more news outlets in number among top 20 indegree and also a wider variety of them. While the visibility in the “pro Bolsonaro” module is given mostly to partisan media, in the “anti Bolsonaro” group there are more mainstream media outlets among the nodes with higher indegree. This means that the information flow is different within each group.

In three of the four networks we analyzed there is a majority of right-wing news outlets in the “pro Bolsonaro” group. Further, in all of them there is also a strong presence of partisan media. These patterns are especially strong around September 28th, when there was a negative story about Bolsonaro. In this case, partisan media tried to disqualify the negative information by spreading a story reporting that the magazine that broke it had been paid 600

campanha de Fernando Haddad (PT) e explicando que não manifestaram apoio a nenhum dos presidentes.”.

²⁷ Translated from Portuguese: “Joaquim Barbosa, ex-presidente do STF, Joaquim Barbosa declara voto em Haddad”.

²⁸ Translated from Portuguese: “Crítico do PT, Marcelo Tas declara voto em Haddad”.

²⁹ Weight measure used for merchandise by Portuguese and Spanish colonies.

³⁰ Translated from Portuguese: “Paulinho da Viola declara voto em Haddad: ‘Negro não se mede em arroba, se mede em batuques, versos’”.

million by the Worker's Party to vilify Bolsonaro. This practice is known as "firehose" and happens when partisan media tries to bury a bad story about a politician through a torrent of false stories [19]. Often, the false stories circulate more among their supporters than the real ones, which was the case here. By doing so, these outlets are able to block certain content and to maintain a positive narrative about Bolsonaro among his supporters through the echo chamber [26]. Further, the partisan media narrative reinforces a biased comprehension of the facts, also making motivated reasoning [13] more likely among the pro Bolsonaro users. Mainstream media only appear within the pro Bolsonaro group when their narrative was used to validate biased news from partisan media. This suggests that traditional media outlets do circulate in echo chambers, but only when their stories are perceived as acceptable (in this case, reinforcing the pro Bolsonaro narrative).

Among the different types of influencers [6, 9, 14, 24], news outlets are normally associated with the idea of informational influencers [24]. These users often propagate new content among social media networks. Informational influencers could be a source of different points of view, but when clusters have a media diet based in partisan media, users reject this possibility. This means that partisan media does not play the proper role of informational influencers, rather they reinforce biased, like-minded narratives, as we observed in the pro Bolsonaro networks.

On the other hand, the "anti Bolsonaro" group had a more heterogeneous media diet, as well as more diversity of discourses. This is especially clear in the datasets of September 28th, when there were more candidates in the presidential run, and in October 27th, when other parties and politicians were declaring their vote for Haddad. While the "pro Bolsonaro" group was strongly identified with him, the "anti Bolsonaro" module was not associated only with Haddad, even though he had an important role in most of the datasets we analyzed.

The variety in the anti Bolsonaro media diet indicates a smaller chance of the formation of echo chambers [26]. Further, the presence of a majority of mainstream media is unlikely to reinforce biased conclusions, making motivated reasoning [13] less likely among anti Bolsonaro users. The presence of international news outlets, such as The Economist, and Brazilian versions of El País and The Intercept in the "anti Bolsonaro" module provides further evidence of their heterogeneous media diet. In the case of the anti Bolsonaro group, media outlets in fact play out their role as informational influencers [24], because the variety of outlets provides heterogeneous content from different points of view. In these groups, we did not find fabricated news among tweets with more circulation, as we did in the others, which is also an evidence of a plurality of information.

Based on our findings, we infer the existence of an asymmetric polarization [4] during political conversations

surrounding the Brazilian election. While anti Bolsonaro users consumed a wider variety of news outlets, pro Bolsonaro users had a very limited media diet centered in partisan media. As mentioned, when there was a negative story about Bolsonaro, this pattern was stronger. Pro Bolsonaro clusters created what Benkler, Faris and Roberts [4] call a self-reinforcing feedback loop, the main characteristic of the disinformation in an asymmetric polarized group.

As polarization and disinformation increases, this can have negative effects on democracy and political participation [8, 15, 20]. The more people consume only partisan stories, the more they tend to rely on "false consensus" [25] and justify extreme positions through motivated reasoning [13]. Considering that partisan media increase disinformation in order to strength a narrative that favors their ideology [4], the political participation of people only exposed to this type of content may be impaired.

Thus, we can argue that this asymmetric polarization may have negatively influenced the Brazilian election results. The biased media diet of pro Bolsonaro users tends to strengthen radicalization of the far-right and consolidate biased conclusions among these groups. This means that pro Bolsonaro users were more likely to consume and trust biased information in order to maintain the coherence of their narrative. By doing so, they created an alternative narrative of the facts and negatively influenced political conversations during the elections.

5 CONCLUSIONS

In this paper, we analyzed four political networks to understand the dynamics of polarization during the 2018 Brazilian presidential elections. In our datasets we identified the presence of two groups. One of them was highly centered in Bolsonaro, which we called the "pro Bolsonaro" group. The other one supported Haddad to an extent, but more than that, shared an anti Bolsonaro sentiment; and we decided to define this second group as "anti Bolsonaro" rather than pro Haddad. In each dataset we identified the top 20 indegree news outlets and mapped them in the network in order to understand the users' media diet. We qualitatively analyzed these news outlets and identified their most retweeted message in each dataset.

In response to our first research question, we concluded that political discussions on Twitter during Brazilian presidential campaign followed a dynamic of an asymmetric polarization [4]. Our second research question focused on the types of outlets that influenced the conversation. The pro Bolsonaro users presented a radicalized behavior by giving high centrality to right-wing partisan media. By doing so, they preserved a biased narrative created to support Bolsonaro. Mainstream media

only received visibility among pro Bolsonaro users when they helped to consolidate this narrative. On the other hand, anti Bolsonaro users had a more varied media diet. In all datasets we analyzed, the anti Bolsonaro group had more news outlets in number among the top 20 indegree. Anti Bolsonaro users also consumed news from a wider variety of sources, including Brazilian mainstream media, many of them with center political views, and even some international news outlets, such as The Economist.

We recognize there are some limitations in this study, such as in only analyzing four datasets. Also, on September 28th we analyzed how a negative breaking news about Bolsonaro reverberated, but on September 11th the breaking news about Haddad was not negative. We had no clearly negative breaking news about Haddad during the run (except some fabricated false news), so we had to select the discussion and reaction to his nomination as candidate to analyze.

Future studies might further analyze the discursive patterns of the anti and pro Bolsonaro groups. Also, future studies can analyze if the asymmetric polarization pattern remains the same during Bolsonaro's first year as president (in 2019).

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