Bursting the (Filter) Bubble:
Interactions of Members of Parliament on Twitter

Para além da Bolha (de filtro):
Interações dos Deputados no Twitter

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Abstract

Western European representative democracy models are strongly party-based, generating different incentives for political actors' communication. Using Portugal as an example, our study analyzes if and how Portuguese Members of Parliament (MPs) interact on twitter, studying their interactions with 757 twitter accounts during one week in four different months.

Our study concludes that, although more than half of tweets didn't have advanced interaction, this type of interaction varies significantly across political parties, which may suggest that party organization may affect their MPs' communication style.

We also conclude that party homophily can be found in some forms of interaction but not in others. These results "bursts" the idea that "filter bubbles" are created around values homophily but validates such a claim regarding status homophily as most of the accounts the MPs interacted with (excluding institutional ones) were from the "Twitter Elite".

Keywords

twitter, political communication, members of parliament, social network analysis, filter bubbles

Resumo

Os modelos de democracia representativa da Europa Ocidental são fortemente baseados nos partidos, gerando diferentes incentivos para a comunicação dos actores políticos. Usando Portugal como exemplo, o nosso estudo analisa como e se os deputados portugueses interagem no twitter, estudando as suas interações com 757 contas durante uma semana de quatro meses diferentes.

O nosso estudo conclui que, embora mais de metade dos tweets não tenham tido interação avançada, este tipo de interação varia significativamente entre partidos políticos, o que pode sugerir que a organização partidária pode afetar o estilo de comunicação dos seus deputados.

Concluímos também que a homofilia partidária pode ser encontrada em algumas formas de interação, mas não em outras. Estes resultados contrariam a ideia de que "bolhas de filtro" são criadas sobre a homofilia de valores, mas validam tal afirmação relativamente à homofilia de estatuto, uma vez que a maioria das contas com as quais os deputados interagiram (excluindo as institucionais) eram da "Elite do Twitter".

Palavras-chave

twitter, comunicação política, deputados, análise de redes sociais, filter bubbles

1. Introduction

From the idea of "digital democracy" (Hacker & van Dijk, 2000) to the potential increase in "direct representation" (Coleman, 2005) and the concept of a "continuous democracy" (Rodotà, 2007), different authors (Blumler & Kavanagh, 1999; Castells, 2004) have mentioned the positive impact the Internet may have on the public sphere and on the political and democratic processes. However, several studies have shown that in social media platforms this potential was not being fulfilled as political actors were using the platform to "broadcast" their message rather than to interact (Larsson & Moe, 2011, Vergeer et al., 2011; Graham et al., 2013).

Western Europe's representative democracies are strongly party-based, and, in the case of Portugal, parliamentary elections are based on direct closed list-elections at a district level. This generates different incentives for political socialization and communication compared to the single-seat constituencies, such as in the United States or the United Kingdom (Teixeira et al., 2012). This has also been suggested by the study of twitter interactions by Members of Parliament (MPs) in Norway (Enjolras, 2014), whose electoral model is similar to Portugal's. This may impact not only the interaction between MPs and their constituents but also between themselves. In such electoral systems, it is important for MPs to consolidate their position within the party to secure re-election, as party career is considered an important factor for legislative recruitment (Teixeira et al., 2012). Furthermore, as suggested by Praet et al. (2021), parliamentary context influences social networks on Twitter.

Besides political actors' level of interaction on social media, it is also relevant with whom they interact. Habermas (2022) suggests the the introduction of social media can even decrease the "deliberative quality" of public debate, reinforcing his concerns regarding "echo chambers" (Sunstein, 2006), downgrading the supposedly

open public sphere to a semi-public sphere (Staab & Thiel, 2022). Bruns (2021) suggests that "echo chambers" and "filter bubbles" (Pariser, 2011) are metaphors that bear too much technological determinism, thereby hiding that the true issue is not just technological but, mostly, growing social and political polarization.

Bruns' (2023) most recent work suggests that, despite evidence of clustering tendencies, there is an interconnection of "personal publics" when researchers study social networks taking into consideration multiple forms of "connection" afforded by the platform (e.g. on Twitter, analyzing more than just retweets). However, most empirical work has been done using "connections" of Twitter follow/followee (e.g. Vergeer et al., 2011 and Guo et al., 2020) and retweets and mentions (Esteve Del Valle & Borge Bravo, 2018) or retweets and reply (Keller, 2020). Almost no empirical work has all public forms of interactions: retweets, quote-tweets, replies and mentions. Furthermore, many studies on "filter bubble" and "echo chamber" effects have been done in two-party systems, where these effects may be a possible consequence of higher social and political polarization of such systems (Urman, 2020), rather than a direct consequence of social media's content personalization and audience fragmentation (Sunstein, 2006).

Portugal is a compelling study case, not only because of its multipartisan closed-list system, but also because it has a singular media ecosystem without relevant political bias (Pereira, 2015), and, therefore, less polarized. This allows for the study of possible political and ideological clusters without the interference of mediatic ones.

Therefore, in analyzing the interaction network of Portuguese MPs on Twitter, our purpose is twofold. Firstly, to analyze if the democratic potential of the internet is being fulfilled with more direct interactions between elected politicians and their electorate, especially in a political system with few incentives for such a type of interaction. Secondly, to support either Habermas' (2022) concerns about "echo chambers" degrading "deliberative quality" or Bruns' (2021) suggestion that the overall interconnection of different "personal publics" surpasses the clustering tendencies.

2. Related literature

Early studies on the use of Twitter by political actors have suggested that the social media platform was not fulfilling its potential for improving the democratic processes as its use by political actors was not as interactive as it could be (e.g. Larsson & Moe, 2011; Vergeer, Hermans, & Sams, 2011; or Graham, et al., 2013). Altought there is a more direct communication between political actors and the electorate, the potential for a two-way interaction (Coleman, 2005) was questioned. Research on the use of Twitter in elections in Europe, like Larsson and Moe (2011), Vergeer, Hermans, & Sams (2011) or Graham et al. (2013) conclude that candidates use Twitter for "broadcasting", simiarly to the communication style adopted offline or in other less interactive websites (like campaign websites). Other early studies that didn't focus on election periods but instead on the use of Twitter by U.S. congresspeople, like Hemphill et al. (2013), also reached similar conclusions regarding the use of Twitter mostly to broadcast "soundbites".

In Europe, studies outside election periods have also shown that the use of Twitter for interaction by MPs is very low (Enjolras, 2014) and has been decreasing (Baxter et

al., 2016). One of the explanations proposed was very high level of demand for MPs' attention and the abusiveness of some messages (Agarwal et al., 2019; Baxter et al., 2016). This may align with the idea of "spiral of noise" (Möller, 2021) – a phenomenon in which social media users with more radical viewpoints encounter like-minded peers and feel more confident to vocal their novel and extremist opinions, even outside of their bubbles, affecting the broader climate of opinion.

While there is some level of interaction, this has been defined as focused on the "Twitter elite". Ruoho & Kuusipalo (2019) conceive this as the priviliged interactions between top politicians and journalists. Enjolras (2014) refered to the effect as "a small world of political communication – a limited network of profiled politicians and new media celebrities" that lead Twitter to be more like an "impression management and power performativity" platform and not a "tool of interactive communication between politicians and citizens" (Enjolras, 2014, p. 24). This doesn't necessarily mean that political actors, such as MPs, don't interact with ordinary citizens at all, but that politicians listen more to actors close to politics and media, possibly because MPs intend to amplify their reach, namely through "vital multipliers such as journalists" (Keller, 2020, p. 193) and political actors with high reach such as other politicians and political influencers.

The literature therefore suggests two research questions:

RQ1: Do politicians use Twitter mostly for broadcasting or for interaction?
RQ2: With whom do political actors interact on Twitter?

2.1 Political discussion, Echo Chambers and Filter Bubbles

There are other "threats" that can delay or prevent the the internet and social media platforms fulfilling their potential to enhance democratic processes. Habermas (2006) mentions that, although the internet has its "democratic merits", specially in authoritarian regimes, it would not solve the issue of deliberation in political communication create its fragmentation (Habermas, 2006) generating "self-enclosed echo chambers (Habermas, 2022, p.159).

The early concept of "echo chambers" is attributed to Sunstein (2006). Sunstein suggests one of the risks posed by the internet is "hidden profiles" which lead to informational cascades and polarization, as people are prone to focus group discussion on common knowledge and, consequently, ignore, supress or even exclude dissident voices. Sunstein (2006, pp. 223-224) refers that, although the internet has the potential to decrease this issue by offering a way for people to get out of their offline "information cocoons", it also creates, in its attempt for personalized content, its own online "information cocoon".

"Echo chambers" are, therefore, created, as personalization makes polarization more probable and deliberation more difficult because "(…) like-minded people sort themselves into virtual communities that seem comfortable and comforting. Instead of good information aggregation, bad polarization is the outcome." (Sunstein, 2006, p. 97). Another metaphor for this type of "information coccon" in which like-minded people cluster is "filter bubbles". Pariser (2011) identified these as result of the tech-

nological evolution of Web 2.0, in which platforms intended to personalize user experience, presenting them content related to their previous preferences on the platform.

Altough "filter bubbles" and "echo chambers" are often used as interchangeble concepts, Bruns (2017) distinguishes them: "echo chambers" are related to homogeny in the relationship network, while "filter bubbles" are an interaction network phenomenon. On Twitter, for instance, "echo chambers" would relate to whom you follow and "filter bubbles" to whom you interact with, be it through comments, retweets or mentions. As Möller (2021) has suggested, while in "echo chambers" humans have the agency of choosing to connect with people who would echo their thoughs, "filter bubbles" are a result of algorithms, which the author remarks has a sense of technological determinism.

However, the two effects could be related, as suggested by Pariser (2011) and Johnson and Gray (2020), referring that, even if users were to actively avoid "echo chambers", following accounts that share different perspectives – following the idea of "context collapse" (Marwick & Boyd, 2011) - the algorithm would eventually filter content to show that which the user interacts most with, therefore reinforcing interaction homophily – the "filter bubble". This, in turn, reinforces social network homophily as users add to their network those with whom they interact, forming a "feedback loop".

Nevertheless, as mentioned, there has been critizism of both metaphors. Besides the idea of "context collapse" (Marwick & Boyd, 2011), that would in part contradict the concept of "echo chambers", Bruns (2019, 2023) and Talamanca & Arfni (2022) critique the technological determinism behind Pariser's theory. These authors note that users are exposed to information and experiences outside of the platforms that also influence their behavior both off and online.

As Bruns (2023, p. 8) mentions, it is in the "large-scale maps of networks of personal publics", such as blogospheres and Twittersphere, that there is more evidence of clustering around shared interests and identities. Twitter is, therefore, consider a prime social media platform for the study of such a phenomenom. However, compared to other social media platforms, Twitter could also be less prone to the creation of "filter bubbles" as the platform doesn't require mutual connection, allowing for "context collapse", and the algorithm shows content that is not directly subscribed by users – either by suggestion or by the proactive search of hashtags.

Previous studies of "echo chambers" and "filter bubbles" on political Twitter have not reached a definitive conclusion. Some studies point to the idea of "echo chamber" effects. Vergeer et al. (2011) find that there are a low number of shared members between the networks of European Parliament candidates, suggesting they are disconnected and homophilious, and Guo et al. study (2020) on the 2016 US elections uncovers the role of opinion leaders in the creation of homogeneous communities on Twitter.

The study of political homophily in Catalonia MPs (Esteve Del Valle & Borge Bravo, 2018) suggests, on the other hand, different types of interaction (following, retweet and mentions) leading to different levels of homophily. Bruns (2019) also concludes that politics also makes social media clusters work in a different way, finding that while "most clusters retweeted more outside content but kept @mentions more internal", the pattern was the reverse for political clusters, where "users retweeted more internal content and @mentioned more external accounts." (2019, p. 73). Furthermore, Praet et al. (2021) also suggest parliamentary context influences social networks on Twitter.

Although having a single-party majority during the time of the analysis might indicate less dense parliamentary relations, the fact that there are many parties represented in Parliament may make it more interactive, according to the Praet, et al. (2021) study.

In Portugal, Twitter is not a popular social media platform (Kemp, 2021), with only 14,6% user levels according to (retrived). However, according to the same report, its use by younger generations (18-24 year-olds) is growing rapidly, from 13,1% in 2015 to 40,9% in 2023, which shows the potential growth of the platform in the coming years.

The "Portuguese Twittersphere" is described by having many of its users from the political and media spheres (Barriga, 2017). Previous studies have shown that when overall users have less participation (Grossetti et al., 2019) and there are very "politically savvy users" (Talamanca & Arfni, 2022), there is more probability of political homophily. This makes the "Portuguese Twittersphere", with its low level of users and high political disposition, a good case study for the existence of "filter bubbles" and "echo chambers".

To study the potential clustering effect and existence of "filter bubbles" in the Portuguese MPs' twitter network, we will answer the following research questions:

RQ3: Are the interaction of political actors online mostly done with people that share their political point of view?

RQ4: Does the type or level of interaction matter in the "filter bubble" effect?

3. Data and methods

Portugal has 230 Members of Parliament, representing 8 different political parties at the time of data collection: 4 left-wing parties: Portuguese Communist Party (PCP), Left Bloc (BE), "LIVRE" (L), Socialist Party (PS); the Animals and Nature Party (PAN), which identifies itself outside of the left-right spectrum; and 3 right-wing parties: Social Democratic Party (PSD), Liberal Initiative (IL) and "CHEGA" (CH), a far-right party. Considering PAN is an associate member of the Greens−European Free Alliance in the European Parliament, which is widely considered a left-wing group, we have, for the sake of this article, considered PAN as a left-wing party.

At the time of the data collection – April to July 2022 – PS had just achieved an electoral victory (January 2022), obtaining a parliamentary majority and therefore being able to govern without the support of any other party.

3.1. Data collection

Following Maireder et al. (2012), we employed a user-centered approach. Using the official website for the Portuguese Parliament[1], we identified the 230 MPs on 2nd April 2022 and their respective political party. We were able to identify twitter accounts for 129 MPs, of which 128 had public access.

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[1] www.parlamento.pt

Using the Twitter API,[2] we collected tweets and their associated metainformation like the interactions and author's account information from MPs accounts in four one-week periods: 2nd to 9th April, 2nd to 9th May, 2nd to 9th June and 2nd to 9th July. These four weeks were outside any campaign period. We selected one week in four different months to avoid bias due to the political calendar as these four months contained different political events, including the final budget vote but also the period after its approval. Other studies on the use of Twitter by MPs in European Countries like Haman & Skolnik (2021) and Baxter et al. (2016) also used a four-week period for their analysis. The result of the search was 2,192 tweets from 69 MPs (from all the political parties).

3.2. Methodology

3.2.1. Tweet Format

There are four types of public interactions on Twitter, "(…) namely like (promoting a tweet), retweet (sharing a tweet with the followers), reply (answering to a tweet), and quote (commenting to a tweet while sharing with the followers)." (Toraman et al., 2022, p. 2). For this study, we didn't evaluate "likes" as these are not a new tweet. We also subdivided the "reply" format in two: the "replies" (@reply) and the "mentions" (@ mention), when an account was mentioned in a tweet, but it was not a direct reply to a previous tweet. Therefore, each tweet was coded as either a "Tweet" (T), a "Reply" ®, a "Retweet" (RT), a "Quote-tweet" (QT) or a "Tweet Mention" ™. One of the innovations of this research was the inclusion and differentiation of quote-tweets, as it requires the analysis of all the links in the tweets of the analysis period (quote-tweets are shown as a tweet with a link).

Other than a Tweet, all other formats require some interaction with other accounts. Nevertheless, as mentioned by Toraman et al. (2022) the retweet is a simpler form of interaction, as it does not require any added content by the author. Therefore, the coding of the format was as follows: No interactions (T); Simple interaction (RT); Advanced interaction: (R, QT, TM).

3.2.2. Accounts Coding

Every account with which an MP interacted on Twitter during the 4-week period was identified. During the analysis period the MPs interacted with 790 different accounts.

Out of the 790 accounts, 33 were deleted or private at the time of the coding, so the 757 public accounts with which the MPs interacted were coded based on their

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[2] The Twitter Application Programming Interface (API) used - https://developer.twitter.com/apitools/downloader - was an interface provided by Twitter to collect data directly from the platform without having to use scrapping and guaranteeing that the data that was mode available respected the data privacy and security settings. This website is no longer available due to changes in Twitter ownership (now X).

Twitter profile and recent tweets, but also with the help of Google search. The categories were defined using a combination of deductive and inductive coding (Corbin & Strauss, 2015), in which the deductive top-down approach was based on previous social network analysis with political agents (e.g. Maireder et al, 2012; Ruoho, 2019) and the inductive bottom-up approach was thematic, in order to identify, analyze and report themes within data (Braun & Clarke, 2016). The coding categories and sub-categories were the following:

> Politicians: Members of Parliament, Members of Government, International Politicians
> Other Political Agents: Parliamentary Group, Official International Political Accounts, Official Government accounts, National and local Party Accounts
> Media: Legacy and digital native Media
> Journalists: Journalists
> Political Influencers: Commentators (that are not journalists), Political Influencers (accounts that focus their posts on political topics and have a large following)
> Companies and Institutions: Companies, Institutions and Associations
> Other Voters: Voters (not included in the other categories)
> Others: Celebrities and non-political influencers

For the categories "Politicians", "Influencers" and "Other Voters", we also established, whenever possible, their political affiliation (either just "Left" or "Right"). This classification was based on the self-report political filiation on their profile description (bio), recent tweets content supporting or rejecting political parties, actors and/or public policies and google search for public figures that publicly support a determined party. Whenever the political affiliation was not clear or certain, it was not accounted for.

3.2.3 Social Network Analysis

We used a Social Network Analysis approach (Haythornthwaite, 1996) and the open-source network visualization software Gephi[3] for the network visualization, as suggested by Bruns (2012) for Twitter conversations.

Firstly, we mapped the network of interactions between MPs for RT and R, as there were too few QT and mentions to be mapped. For the RT network, the node size was based on its in-degree (the more the MP tweets were retweeted, the bigger the node), as it would show whose content was considered more valuable by other MPs. For the R network, the node size was based on the out-degree, to visualize the MPs who engaged more in conversation with others.

Next, we repeated this exercise using all the accounts with whom MPs interacted. The MPs were identified by party, while media and journalist accounts were aggregated into a single category and all remaining accounts were identified as either "right", "left" or "non-identifiable", using different colors.

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[3] https://gephi.org/

3.2.4 Other methods

After a first data analysis regarding tweet activity and tweet formats, we used Statistical Package for the Social Sciences (SPSS) to generate a General Linear Model (Miller et al., 2002) that incorporates dependent variables (in this case the number of RT, QT, M, R for each MP) and categorical or continuous independent variables – in this model with the political party as a "fixed value".

4. Findings and discussion

Regarding the first research question "Do politicians use Twitter mostly for broadcasting or interaction?", we examined the different tweet formats used by MPs during the four weeks. Most tweets did not have an advanced form of interaction, with 44% being stand-alone tweets and 25% being retweets. From the advanced interactions, 17% were replies, 8% quote-tweets and 6% tweets with at least one mention. This seems to be aligned with early studies on the use of Twitter by political actors (Larsson & Moe, 2011, Vergeer et al., 2011, Graham et al., 2013) and its lackluster performance in improving the democratic process.

When analyzing per political party, there is a clear difference in the Twitter use by MPs of the far-right CH, with almost no interaction at all (2%). The only MP of L was very interactive on Twitter, including more advanced forms of interaction like replies (31%), quote-tweets (11%) and tweet mentions (21%).

Parties closer to the ideal of "network parties" developed by Klimowicz (2018) – namely, BE, L and IL - are responsible for a higher amount of interaction, when compared to the number of MPs they have on Twitter. For instance, although only 5% of the MPs with Twitter account are from IL, they are responsible for 23% of the replies and 17% of quote-tweets. Klimowicz (2018) characterizes "network parties" as a movement of parties in Europe developed mostly after the financial crises of the late 2000's, with tech savvy leaders and a collaborative network approach to communication and leadership. The party that fits best this description in Portugal is "Livre", both in the communication style and in its internal democracy, but both IL and BE are very close to the definition. Although BE was created before the financial crisis the rest of the definition fits perfectly as it has a "(…) collegial leadership style, a much factionalized functioning, an emphasis on participatory tools and bottom-up mobilization." (Lisi & Cancela, 2019, p. 393). IL doesn't have a collegial leadership style as BE nor open primary elections as "Livre", but it was created after the financial crisis, can be considered a "new right party" and has a very digital presence, even being called the "Twitter Party" (Pinto, 2019, p. 50) because of the regular use of the platform by the party's leaders.

Regarding MPs' interaction patterns, the complete opposite to "network parties" happens with the center-right PSD and the far-right party CH, with both being responsible for a much lower percentage of the interaction formats compared to their number of MPs on Twitter.

To confirm this effect, using SPSS, we estimated a General Linear Model with the political party as a "fixed value". Using "advanced interaction" (sum of

QT, TM and R of each MP) as dependent variable the result was considered significant − R Square of 0.353 and p<0.001 -, but it is not significant for RT as dependent variable.

These results can point to the idea of "appropriation" (Silverstone & Haddon, 1996) in the sense that MPs use Twitter in different ways depending on their political goals and the communication strategies associated – for instance, MPs from "network parties", with their collegial leadership and open legislative recruitment, seem to find interaction on Twitter a good fit for their strategy, as other parties like the far-right CH does not having a more centralized leadership.

When answering RQ2 "With whom do political actors interact on Twitter?", it is possible to conclude that many of the interactions registered are with other politicians (19%), political influencers (14%), journalists (5%) and media accounts (8%). Outside of the professional political "elite", other voters represented only 25% of accounts interacted. These results seem to be in line with previous studies regarding the existence of a "Twitter elite" (Ruoho & Kuusipalo, 2019), mainly composed by political and media actors, extending to citizens with more political influence in the network, which have been considered "vital multipliers" (Keller, 2020, p. 193).

As shown in Figure 1, although politicians are 19% of the accounts with whom there was any type of interaction, 22% of the total interactions were with politicians. This is the category of accounts with the most interactions. Among the "politicians", 36% were "other Members of Parliament, 30% "other politicians", 26% "international politicians" and 8% "Members of Government". We can conclude that political actors are often the target of interaction on twitter by MPs, which is aligned with the communication impact of a political system in which party-career is key for legislative recruitment (Teixeira et al., 2012).

For the more grassroots category of "other voters", we observe the opposite phenomenon, of representing 25% of the accounts interacted with, but only 19% of total interactions, which means more plurality but less frequency or intensity in interaction. One possible explanation for these results is that MPs understand the value of interacting with "ordinary citizens", but their interactions are an occasional one-time interaction with some of them, as if to perform a duty, and not a recurrent on-going conversation as they may do with other political actors, influencers, or journalists that they consider more valuable or with whom they have already an established relationship.

Around 34% of the interactions occurred with institutional accounts – accounts that don't represent a person but an institution. These compose a variety of different institutions, ranging from "other political agents" (18% of interactions), media accounts (9%) and "companies and institutions" (7%). As seen in figure 2, "other political agents" and "companies and institutions" accounts are mainly retweeted or mentioned. The subcategory of "other political agents" is broad and includes, for instance, the accounts of the parliamentary groups, where MPs often retweet their own speeches. One possible explanation is that these types of interaction are to promote their work, either in a call out (in a mention) of institutions the MPs visited, are working with or have been mentioned by (e.g. retweeting a tweet in which they are mentioned).
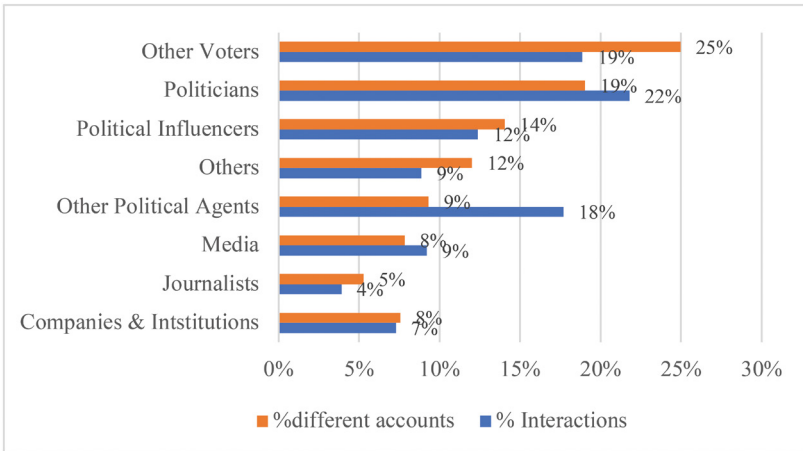
Figure 1 - *Distribution of interactions by account type and distribution interactions with different accounts by account type*

In Figure 2, the analysis of the distribution of interactions for each tweet format shows us other differences worth noting. 41% of the MPs' replies are to "other voters", the "ordinary citizens", and 17% are to "political influencers" which means that more than 50% of the replies are to constituents. While a low percentage of interactions means these results don't fully contradict the idea that MPs are underusing Twitter's potential for interaction with constituents, constituents do have a significantly greater weight among replies, showing a more advanced level of interaction with this type of users.

However, this percentage is significantly lower in other tweet formats, with interactions concentrating more on politicians and other political agents. Media and Companies & Institutions are also not accounts that MPs usually reply to, likely due to them not being individual accounts with which MPs can engage in conversation. Depending on the tweet format (RT, R, QT, TM), the MPs interact with different types of account.
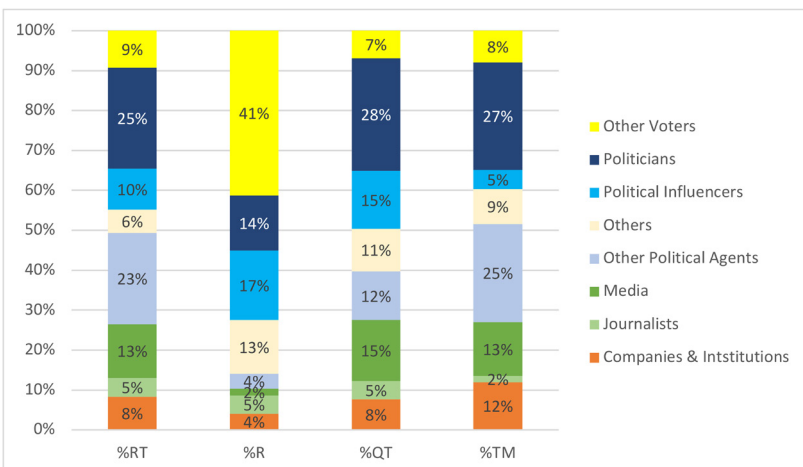
Figure 2 – *Distribution of interactions by account type for each tweet format*
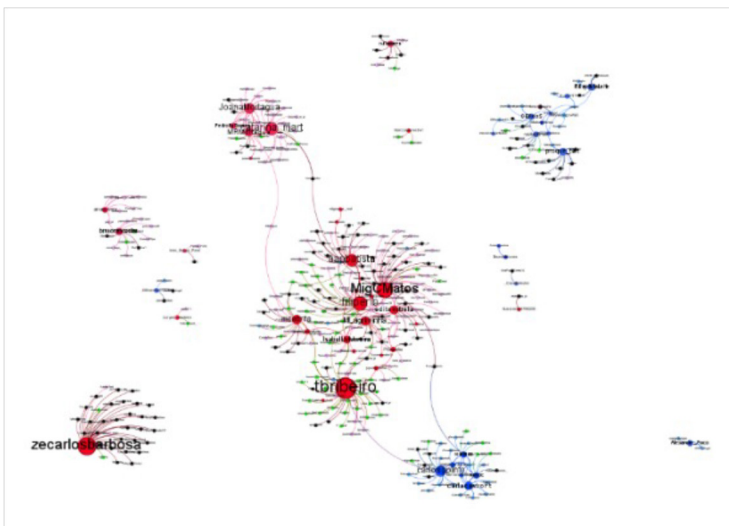
Figure 3 – *Retweet network (size based on out-degree, colors based on right-left political position and media)*

To answer RQ3 **"**Are the interactions of political actors online mostly done with people that share their political point of view?", we started by analyzing the social network of MPs' interactions with each other. The result of the retweet network could be considered a "fragmented network" (Praet et al., 2021), as there is interaction between MPs of the same political party, but almost nonexistent (RT) interaction between MPs of different political parties which, as a first explanation, seems to be aligned with the idea of "filter bubbles" (Pariser, 2011). The only exception is a tweet from a PS MP that was retweeted by an IL MP regarding a topic of interest of the region that both the MPs represent. In this case, the RT was based not on a political party alignment but in the interests of the region that elects both.

However, in the reply network, there is not such clustering around party ideology, as different MPs reply to MPs of other parties. However, there is still a level of ideologic homophily as almost all the replies from left-wing MPs were to other left-wing MPs, except for a conversation between a BE MP (left) and an IL MP (right).

This analysis also allows us to start answering RQ4 "Does the type or level of interaction matters in the effect of "filter bubble"?" - as it becomes clear that party homophily level of the retweets and replies is very different.

The retweet network (Figure 3) shows a fragmentation with just a few nodes (accounts) that are retweeted by MPs from different "communities" (based on modularity). The only accounts that unite different ideologic "communities" are institutional accounts, like @EuropeElects - that was retweeted by MPs of PS and IL, or academic accounts, like @RBReich - that was retweeted by MPs of BE and PS.

Figure 3 also shows that there is a particular case is of a PS MP, @zecarlosbarbosa, that has a "community" of his own, separated from the nodes of the other MPs, including from the same party. This exception led us to investigate if there was a common pattern of this MP's interactions. This MP mostly interacts with accounts related

to trains in which, based on his public curriculum, he seems to be a professional and have a personal interest and not just a political one. This case shows different uses of Twitter by the MPs, as the use of the platform for personal, professional, or political purposes will affect their interactions and common nodes with other MPs, in line with the idea of Bruns (2019) that offline interests and interactions reflect on online ones and decrease the potential for "filter bubbles".

Analyzing Figure 3, it is also clear that there is a right-left homophily in the retweet social network, with all the accounts with a known or perceived filiation to the Left in red and to the right in blue, the media in green and the non-identifiable in black.

As seen in Table 1, political parties closer to the center in the right-left spectrum (PS and PSD) are less prone to retweet accounts from the same political inclination, while among more radical political parties (PCP, BE, IL, CH) 80% or more of the accounts they RT can be identified as having the same political inclination as the retweeting MP. However, not having the same political inclination doesn't mean it is an opposite one (it can be, for instance, a company that doesn't have a political inclination at all).

Therefore, we analyze the percentage of accounts the MPs interact with that have an identifiable opposite inclination (table 1). The results clearly show that, regardless of the party, for different formats of tweets (R, TM, QT, R) there are different levels of interaction with accounts with an opposite point-of-view: RT and TM being mostly nonexistent, and QT and Reply with some level of interaction.

	Of same political inclination				Of opposite inclination			
	% RT	% TM	% QT	% R	% RT	% TM	% QT	% R
PCP	83%	40%	33%	77%	0%	0%	50%	4%
BE	89%	68%	100%	45%	0%	0%	0%	39%
L	44%	80%	55%	26%	0%	0%	25%	29%
PS	38%	21%	35%	30%	7%	14%	21%	23%
PAN	50%	79%	25%	46%	0%	0%	0%	25%
PSD	56%	63%	55%	36%	0%	0%	8%	32%
IL	80%	69%	46%	50%	2%	10%	32%	30%
CH	100%	0%	0%	0%	0%	0%	0%	0%

Table 1 - *Percentage of retweets, tweet-mentions, quote-tweets and replies from MPs to other accounts of the same and of the opposite political inclination (left-right)*

This conclusion can also be visualized, for instance, comparing Figure 3 – the retweet network - with Figure 4 – the reply network. The reply network is not nearly as fragmented, showing many different nodes that are a target for interaction by MPs of different political parties.

These results corroborate the results of previous research (Bruns, 2019; Esteve Del Valle, M. & Borge Bravo, R., 2018) in showing that different tweet formats have different levels of political homophily and are aligned with the results from RQ2 that different tweet formats are used to interact with different types of accounts.
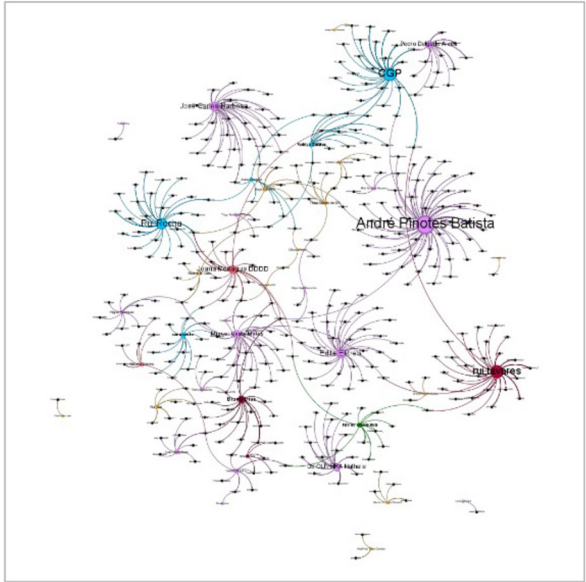
Figure 4 – *Reply Network (size based on out-degree, colors based on party)*

5. Study limitations

Although this study provides relevant analysis and conclusions, it has some limitations. This study doesn't address the content or quality of the interactions. To manually analyze all the accounts that the MPs interacted with and to include the analysis of QT and TM, the timeframe of analysis was relatively short. Furthermore, it is important to consider the specific period of political life that was analyzed that allows for conclusions to be interpreted as clues and less definitive conclusions for all political frameworks.

6. Conclusions

Our results suggest that the Portuguese MPs do interact on Twitter, but "one size does not fit all". Although most of the tweets didn't have any form of advanced interaction (being just tweets or retweets), the level of interaction of MPs is not the same for all political parties. MPs of the far right-wing party CH almost didn't interact at all with other accounts, while MPs from "network parties" (BE, IL and "Livre") interacted the most, suggesting that party organization affect MPs' communication style.

Furthermore, although engagement with constituents ("influencers" and "other voters") didn't represent most of MP's total interactions, they were most of their replies. This is arguably the most "democratic" format of interaction, as it adds content to the interaction (unlike retweets) and shows a willingness to engage in a conversation -

unlike quote-tweet or tweet-mentions, that are often considered more a "call out". It is also in this form of interaction – replies - that we could find less political homophily, with almost one third, on average, of all accounts with whom the MPs interacted being from the opposite left-right alignment.

One of the reasons that can explain both the existence of a lower interaction rate in the "catch all" parties – PS and PSD – and the inexistence of the "filter bubble" in the MPs' replies is the concept of "spiral of noise" (Möller, 2021). As some of the MPs' tweets comment sections are filled with dissonant voices, they may give up on interacting on Twitter or, indeed, forgo using Twitter at all - as referred by Baxter et al. (2016). As Portugal has a political system that is strongly party--focused (Teixeira et al., 2012), the incentives for interaction with the voters online may be more indirect, namely the built of symbolic capital to gain party favor, and not adopted by every MP.

If the phenomenon of "filter bubbles" based on political ideology was not found in the reply and quote-tweet networks, in the retweet and tweet mention networks there is a clear homophily, especially if we exclude from the analysis all the accounts that don't have a clear political alignment (e.g. institutional accounts). However, even if MPs don't usually retweet accounts that have an opposite political alignment, they do retweet accounts that have a neutral or non-identifiable one. This doesn't only happen with media accounts, as MPs retweet the news, but also with institutional accounts and, in some cases, MPs also use twitter also for personal or professional (non-political) gain and interact with accounts that are not politicized. We can conclude that, in line with Bruns (2019, 2023), "filter bubbles" cannot be analyzed as a phenomenon regardless of the interaction format (RT, QT, TM, R) or the motivation for the use of the social media platform.

If, in one hand, at a first glance this analysis seems to suppress Habermas' (2022) concerns regarding the decrease of quality of democratic deliberation, there is still the issue of the "type" of account with whom MPs interact with. We can observe not a full homophily of political values, but a certain level of another type of homophily mentioned by Lazarsfeld & Merton (1954), status homophily, based on major, formal or informal social status characteristics, and not on values, attitudes and beliefs.

Therefore, the other conclusion of our research is aligned with Möller (2021) that, more than a left or right echo chamber, there is a chamber of people interested in the politics and current affairs and those who are excluded. This is evidenced by the fact that almost 40% of accounts with whom MPs interact - or 60% of the accounts if we exclude institutional or anonymous accounts – are from either politicians, political influencers, or journalists. This suggests that there is, indeed, a "Twitter elite" (Ruoho & Kuusipalo, 2019) that doesn't absorb fully MPs' attentions but definitely has a high influence on it.

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