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Bots as online impersonators: automated manipulators and their different roles on social media

Abstract:

Social bots are automated agents programmed to act on social media impersonating human behaviour to influence discussions online. This paper aims to contribute to the discussion of how bots can endanger online communication and alter information flows. We resorted to a mixed-method approach based on grounded theory and observational techniques in order to investigate the bots' activities online during the 2016 municipal elections in Rio de Janeiro. We collected related content on Twitter in this period and detected 3,101 bots. This sample was classified in three categories based on tweeting content: user-generated bot, media spambot, and political bot. Our findings indicate that, although bots work for different political and social purposes, their computational nature claims into service of dominant social groups and economical elites. We conclude that computational propaganda is building a dangerous scenario of widespread automation in which different kinds of algorithms bias social media conversation.

Keywords: Astroturfing, Brazil, Elections, Grounded theory, Social Bots, Twitter

Agenda:

1. Introduction	2
2. Literature review	2
3. Materials and Methods	3
4. Bot categories based on content	4
5. User-generated Bot	5
6. Media Spambot	6
7. Political bots: campaigners and inciting agents	8
8. Discussion and final considerations	8
References	9

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1. Introduction

In Brazil, the influence of social media on voting results is being boosted by recent electoral law reforms. In 2015, the Brazilian Federal Supreme Court decided to prohibit donations from companies and institutions to electoral campaigns (Ramalho, 2015). Since 2017, the Brazilian Congress has legally authorized the payment for content promotion in social media by candidates or political parties during their campaigns (Venturini, 2018). These two changes combined have turned the internet into a key electoral battlefield, introducing a new grassroots-based mode of citizen-centered campaigning' online.

Astroturfing as fake grassroots action sponsored by groups or corporations to support discourses in their favor or to criticize adversaries is not new (Cho, Martens, Kim & Rodrigue, 2011; McNutt & Boland, 2007). However, the rise of social media has changed the dimension, significance and social implications of this phenomenon. Instead of becoming a new force in global politics in favour of plurality, transparency, horizontality, and representing an opportunity to improve the public sphere, social media is threatening informational and democratic ethical principles.

Social bots have been increasingly used to intentionally distribute misleading information and to produce and disseminate content automatically, creating a kind of artificial public opinion on social media networks. These bots engage in digital astroturfing, emulating community behaviour, spreading campaigns disguised as popular and spontaneous and impersonating real users. As a combination of algorithms, automation, and human curation, computational propaganda has started to truly interfere in domestic political processes around the world (Wooley & Howard, 2016; Bradshaw & Howard, 2017).

In Brazil, these automated techniques have been identified on social media during major political events since 2010 (Arnaudo, 2017), and empirically evidenced during the political campaigns for the 2016 Rio de Janeiro municipal election (Albuquerque, 2016). However, there is a latent demand for effective fieldwork research to gain a deep understanding of actors and intentions behind digital astroturfing, which is increasingly personified and personalized by the cross-usage of big data and social bots (Santini et al., 2018). Thus, the aim of this paper is, by means of a critical study of the 2016 municipal elections in Rio de Janeiro, to contribute to the discussion of how bots can endanger online communication and affect election campaigns and outcomes.

In the next section, we discuss the relationship between media, politics and information ethics, describing how the manipulation of public opinion has evolved into digital astroturfing on social media platforms. Thereafter, we present how we have employed observational techniques through a grounded theory approach to analyze bot behaviour on Twitter during the first round of 2016 Rio de Janeiro municipal election. Then, we state our results on bots' accounts classification and discuss how computational propaganda is building a dangerous scenario of widespread automation in which different kinds of algorithms bias social media conversation.

2. Literature review

Traditionally, political campaigns have relied on grassroots organization. These are, in general terms, collective political movements that operate voluntarily and seek to influence specific causes of a social and/or political nature (Cho, Martens, Kim & Rodrigue, 2011; Gundelach, 1979). Although digital media has had a huge impact on social movements, enabling new forms of resistance, the expectation that computer-mediated communication would bring people closer and encourage mobilization (Papacharissi, 2002) has not been entirely fulfilled. Several types of online membership and engagement have appeared since the 2000s, such as cyber-membership, internet campaigning and networked participation. Simultaneously, new forms of grassroots simulation also thrive online, fuelled by the same tools used by social movements: political campaigns started investing their huge budgets in manufacturing mobilization and participation (McNutt & Boland, 2007).

Contemporary political campaigns rely largely on digital media initiatives, with organizations using technology to raise money, engage volunteers, do research on other candidates, and gather data on the electorate

(Howard, 2005). Political information and computational power have become an imperative asset for success: victories have come from the quality and quantity of data. Candidates and parties, in order to get closer to their electorate, seek to enlarge their support networks online as a strategy to escape the gatekeepers, thus giving wide knowledge to the proposals of candidature, to promote debates and to interact with society (Alves, 2017; Skogerbø & Krumsvik, 2014).

Against this big data backdrop, several manipulation initiatives are being ubiquitously employed in the current political scenario (Woolley & Howard, 2016), such as social bots, defined as a “computer algorithm that automatically produces content and interacts with humans on social media, trying to emulate and possibly alter their behaviour” (Ferrara et al., 2016, p. 96). The concept of political bots consists of software-driven agents programmed to act on social media with the purpose of influencing political discussions, endorse or defame a candidate, spread campaign propaganda, or to create noise in public debate (Woolley, 2018; Woolley & Howard, 2016).

Artificial grassroots for political manipulation is assuming a new dimension given the pervasiveness of the Internet and social media (Sisson, 2017). These online astroturfing techniques are embedded in larger computational propaganda strategies extensively used by governments, candidates and political figures to intentionally distribute misleading information on social media platforms (Bradshaw & Howard, 2017). These software, ideologically programmed to act as a social control tool, are built upon interactive agents and big data that aim to affect decision-making and directly impact elections, referenda, and opinion formation.

In view of the mutual implication and dependence between science, technology, social relations and discourses (Bezerra, 2017), it is necessary and urgent to reflect on the new configuration of information regimes (González de Gómez, 2012). Bots have the potential to shape the flow of information on social media since software-driven fake profiles take advantage of rapid, large-scale and disguised information dissemination online. As these automated accounts take part in the logics of disinformation, disseminating messages in an orchestrated way to their followers, we should consider that they operate as algorithmic mediators of information.

The use of algorithms and automation tools combined with human curation have raised ethical concerns given the possibilities offered by machine learning applied on social media platforms. Furthermore, the employment of complex strategies to manipulate public opinion increases the business potential for the bot and troll industry, as put forth by Ong & Cabañes (2019). Bearing this in mind, critical questions arise: who is behind social bots, who builds and manages them? What role do bots play on social media platforms? What is the nature of the content disseminated by bots on social media and which sources do they use? Following this agenda, this research presents a qualitative analysis of bots behaviour.

3. Materials and Methods

We resorted to a mixed-method approach based on grounded theory and observational techniques in order to investigate the bots' activities in online political campaigns. Grounded theory encompasses flexible strategies for collecting and analyzing data, generating theory or hypotheses of actions, interactions, or processes through interrelating categories of information (Creswell, 2007). We also used a non-obstructive strategy to analyse bots as an ethical research decision, considering that interaction could increase the accounts' visibility and prominence, altering information flows and collaborating with bots' strategies. Thereby, the observation of bot mimesis occurred without any interaction.

To study the roles and features of social bots during the 2016 Rio de Janeiro municipal election, we created a dataset of bot profiles and their respective tweets during the first round of the electoral campaign period (August 17th - October 2nd). In addition to Brazil having the fifth largest Twitter user-base, as of April 2021 (Statista, 2021), it plays a key role among social media platforms, especially in the political arena, making it a pervasive tool in election campaigns and concentrating a significant body of studies on media manipulation (Santini et al., 2018). Tweets were collected via the Twitter Firehose API version on a streaming basis during this interval. The filtering criteria used in data collection included the word “Rio”, the main candidates' names

(Crivella, Freixo, "Pedro Paulo", "Índio da Costa", Bolsonaro, Jandira, Molon and Osório), and electoral campaign hashtags (#Crivella10, #freixo50, #é15, #molonprefeito18, #indio55, #forçapramudar and #Jandira65).

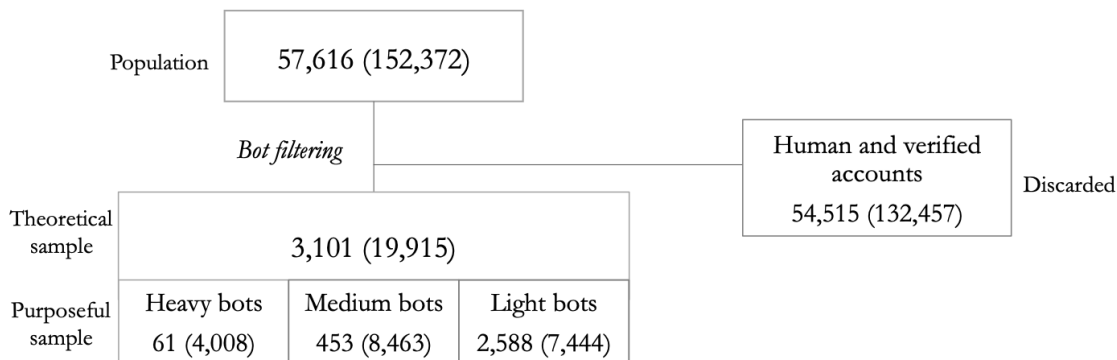


Figure 1: Process of data collection and sampling. Each box contains the number of Twitter accounts and the respective number of tweets between parentheses.

In our data extraction, 152,372 tweets posted by 57,616 profiles were detected. To identify bot accounts, two criteria were applied to the dataset, based on Gorwa (2017), Chavoshi et al. (2017) and FGV DAPP (2017): (i) tweets must have been published consecutively in less than one second, and at least two times; and (ii) a minimum of 10% of the content must have been produced automatically. Twitter verified accounts were excluded from the corpus even though they use automation mechanisms.

Our initial theoretical sampling consisted of 3,101 profiles responsible for 19,915 tweets. Accordingly, an account posting distribution was plotted and a three level bot classification based on the amount of tweets was formulated (see Figure 1): *light bots* (2,588 bots that were responsible for 7,444 tweets - average of 2.88 tweet per bot in the period), *medium bots* (453 bots that were responsible for 8,463 tweets - average of 18.68 tweet per bot in the period), and *heavy bots* (61 bots that were responsible for 4.008 tweets - average of 65.70 tweet in the period).

After verifying different posting patterns, we identified the “optimal examples” or “best cases”, also called “excellent informants”. We defined our purposeful sample as the set of 61 most active bots (called heavy bots), because of their wide-spreading capacity and impact on Twitter. The heavy bots represent 1.96% of bots but were responsible for 20.12% of the tweets. Additionally, the amount of 61 bots would be satisfactory as it represents double the average of informants selected for a typical grounded theory study. We selected the *heavy bots* as our analytical corpus considering they have a higher chance of providing significant, pertinent and informative data about the conceptual behaviour of bot accounts.

4. Bot categories based on content

The choice of grounded theory approach was important to reduce bias that usually forces researchers to fit their ideas into pre-existing categories. Using the constant comparative method, we generated three theoretical categories based on bot content. After testing them out, comparing similarities and distinction and considering the relationships between them, we created new analytical categories to analyze our purposeful sample that is described and discussed in the following subsections. There are the *User-generated bots*, the *Media Spambots*, and two sub-categories for *Political bots*: the *campaigners* and the *inciting agents* (Figure 2).

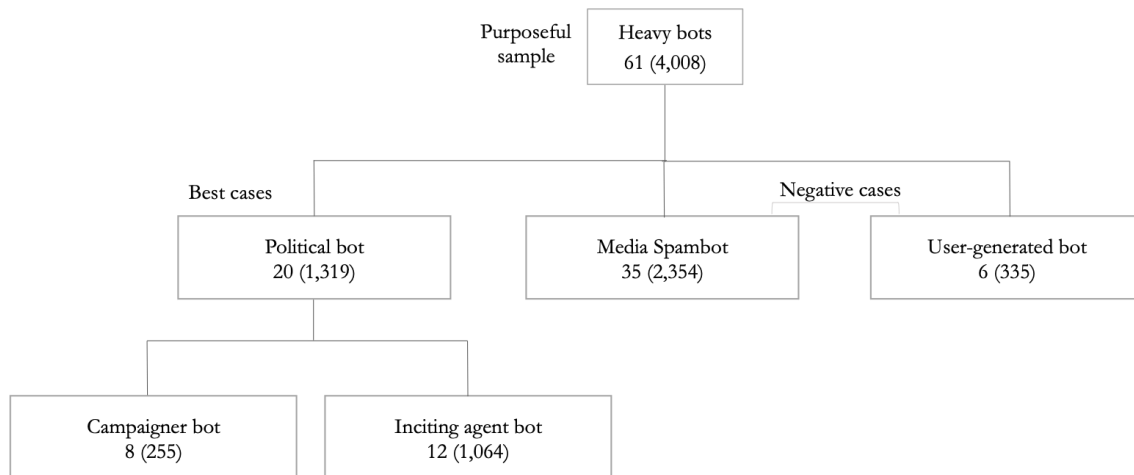


Figure 2: Bot categories based on content analysis. Each box contains the amount of bots in each category and the respective number of tweets between parentheses.

5. User-generated Bot

Among our analytical corpus we identified User-generated bots. These accounts presented an automated behavior stimulated by a promotional program called TIM Beta offered by the telecom company TIM, a subsidiary of Telecom Italia in Brazil. The purpose of the program is to induce TIM mobile phone users to extensively disseminate specific hashtags on Twitter (#TimBeta, #BetaLab, #OperaçãoBeta, #MissãoBeta), thereby earning them points that are converted into call minutes.

Tim Beta members can be recognized by the hashtags used in posts and profile descriptions, and by a small icon or logo on profile photos. To separate these accounts, an automatic search was performed with the hashtags used in the campaign. In the first data coding round, 111 user-generated bots, responsible for 1,124 tweets, were identified. Among our best cases, two accounts were automatically classified as user-generated bots. After the observational analysis of heavy bots four more user-generated bots were spotted, making a total of 115 bots and 1,347 tweets.

Commercial brands have been explicitly using bots to interact with customers and promote their products and services. For example, Spam bots can be designed to post on social media platforms comment sections (Gorwa & Guilbeault, 2018), and to spread advertisements, posting commercial tweets (Hayati et al., 2009). Social media sites used to fight against the presence of bots and other kinds of frauds, but in recent years they have been helping brands to develop customer service bots as a profit-making activity (Simonite, 2016).

In an innovative manner, the TIM campaign employs an interesting gamification strategy to stimulate user participation, encouraging competition between members. Focused on their performance in the “game”, users automate their own accounts to achieve better results. By manipulating the campaign, the users themselves transform user-generated bots into media space for the TIM brand. Therefore, the company is promoted by user-generated content (Jenkins, 2008) boosted by automation strategies in their accounts, which can be seen as a new version of web 2.0 customer-generated content brand strategies (Thackeray, Neiger, Hanson & McKenzie, 2008). We observed that user-generated bots users probably copy automation code routines, i.e., in a computational programming web forum, that already contain URLs.

6. Media Spambot

After comparative analysis, we identified another important empirical category of bot: automated profiles that only disseminate links to Brazilian mainstream news media websites. Figure 3 shows the distribution by type of content posted by the 3,101 bots, responsible for 19,915 tweets (see Figure 1). The dataset indicates the pervasive role that automated accounts play in disseminating links to media outlet websites on Twitter.

According to our sample, of all tweets 43.4% are links to the websites of two groups of Brazilian mainstream media: Globo Group (globo.com) and Folha Group (that owns the website uol.com.br), which together counted for 8,655 posts. The website abril.com.br is also from the Brazilian media conglomerate Abril, and terra.com.br is a news media online platform from the Spanish telecommunication group Telefónica. Globo Group, formerly known as Globo Organization, is the largest mass media group of Latin America (Grupo de Mídia, 2017). Uol.com.br is the leading Brazilian company for web content and services and is controlled by Folha Group, the third largest Brazilian media conglomerate, after Globo Group and Abril Group (Grupo de Mídia, 2017).

The total number of social media links tweeted by the 3,101 bots of our sample – links to Twitter, Facebook, Youtube, Instagram – is also relevant. Finally, the frequency at which “linkis.com” appears in the automated profile posts stands out. Linkis.com is a free link customization service for social promotion that automates posting and shortens URLs, so it is not possible to identify the real link they address.

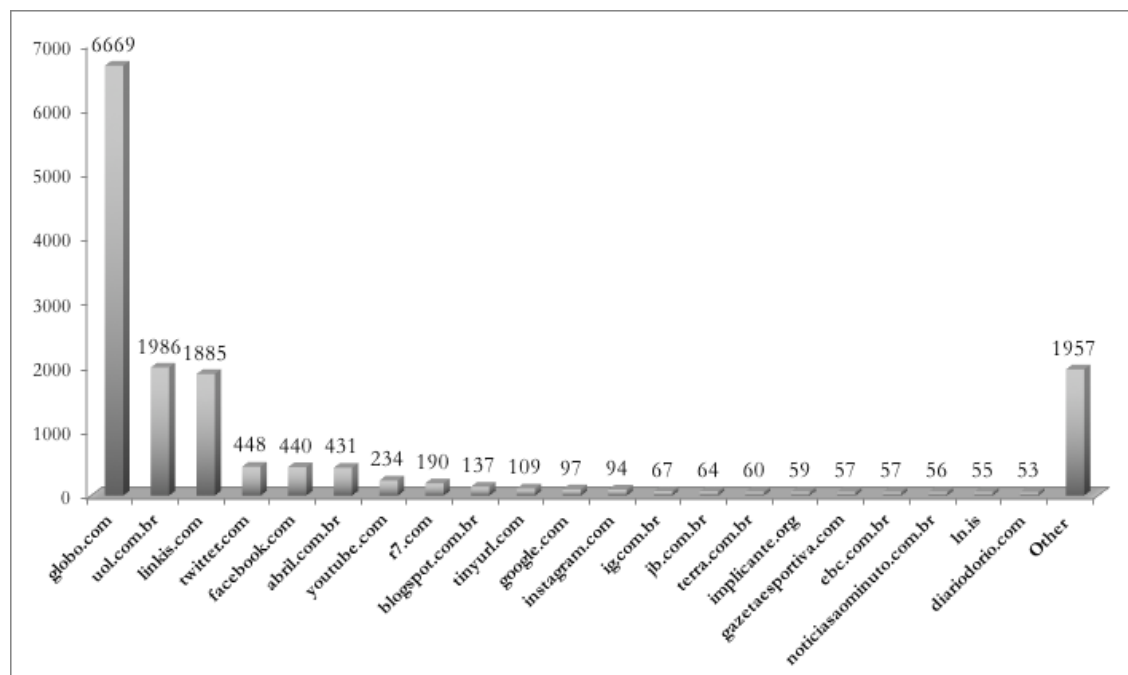


Figure 3: Amount of tweets on our theoretical sample in function of the link domain tweeted. Link domains that appear in 50 or more tweets are considered in this chart. Link domains that appear in less than 50 tweets are grouped and presented as "Other".

Among the 61 heavy bots analyzed, we identified that 35 accounts (57% of the profiles in our purposeful sample) only posted links to media websites. Hence, we confirmed the existence of a bot behavior pattern, represented by a group of online impersonators, programmed to only disseminate media links on Twitter. Considering these 35 media spambots, 21 profiles present a coherent pattern of posting, tweeting only one source of media content: links to Globo Group websites (g1.globo.com, globo.com and oglobo.com). This pattern indicates that these automated accounts probably work to boost Globo audiences and amplify their social relevance. The other 13 media spambots posted links to Globo websites mixed with other sources,

especially the Folha Group website (uol.com.br), and one more automated account (@trendtopicsBr) which probably works for Twitter, only posting trending topic updates.

The emergence of this category on our dataset analysis was based on Brazilian Twitter profiles that post in Portuguese. Despite this, our result converges with the latest Pew Research Center report (Wojcik et al., 2018) which demonstrates that automated accounts post a substantial share of links to a wide range of US online media outlets on Twitter. The Pew Research Center (2018, p. 8) analysis "estimates that 66% of tweeted links to popular news and current events websites are posted by bots" in the United States, and found that a relatively small number of automated accounts are responsible for a substantial share of the links to popular U.S. media outlets on Twitter.

We created the category of Media Spambot to open a theoretical discussion on the behavior of these agents and their effects on cultural and political processes. Spambot is a computer program used to assist in the sending of spam, "designed to reach a broad audience, spreading information and links" (Grimme, Preuss, Adam & Trautmann, 2017). Once social networking services rose to prominence, spammers began to impersonate users with automated accounts, creating profiles on social networks and trying to spread advertisements, commercial or malicious content (Gorwa & Guilbeault, 2018)

However, the use of Spambots on Twitter to disseminate media companies' news and attract users to their websites is emblematic of a particular case of public sphere manipulation, considering the prominent position the mainstream media has in the overall news and information environment. Rather than falsify media brands and benefit from their image to publish imposter content, such as other disinformation agents identified by previous research (Wardle & Derakhshan, 2018), media spambots actually promote these companies' websites. The use of impersonator spambots by powerful media outlets may alter user perception of political discourse on social media, manipulate online ratings, change what people consider "relevant", distort the agenda-setting process, and obstruct the constitution of a real public sphere.

The phenomenon of media manipulation, that covers an array of practices, has been the subject of much scrutiny and attention in recent years. According to Marwick and Lewis (2017), there are people circulating content to push their worldview, often using the mainstream media to increase its audience; people who strategically spread so-called "fake news"; trolls who create chaos for fun; politicians with a vested interest in propagating certain frames, etc. However, little is being said about the possibility of online "manipulation by the media outlets" themselves, which may also take advantage of social media vulnerability.

For Marwick and Lewis (2017, p. 1) the media's dependence on social media analytics, metrics and clickbait makes them vulnerable to such manipulation. And we draw attention to the fact that this dependence on audience measurements can also turn them into audience rating manipulators. Considering the rise of a disinformation market (Hoffmann, Taylor & Bradshaw, 2019) and the economic uncertainty surrounding technological transformations that pressure industry stakeholders to develop self-preservation strategies (Napoli, 2011), there is a research agenda on how the media spambots amplification on websites traffic can be ultimately related to financial motivations (Santini et al., 2020). This diagnosis is even more critical if we consider the Brazilian media marketplace, which is highly concentrated among a few influential players, characterizing an oligopoly. Fraud in online social media by media outlets may contribute to diminish trust in the mainstream media, and increase misinformation and other forms of Brazilian public opinion manipulation.

We did not investigate if the media spambots currently have a "political bias" in their overall link-sharing behaviour. This conclusion can only emerge from a content and discourse analysis of news media websites, shared by bots, that contain politically-oriented material. However, a key dimension in discussing media spambot action is evaluating the extent to which it compellingly illustrates that the media outlets function as a cultural and political institution, in the sense of the institutional theory framework (Napoli, 2014).

7. Political bots: campaigners and inciting agents

The last and most important part of our analytical process was the qualitative analysis of the 20 accounts codified as political bots, defined as "algorithms that operate over social media, written to learn from and mimic real people so as to manipulate public opinion across a diverse range of social media and device networks" (Woolley & Howard, 2016, p.4885). During electoral processes, semi-automated accounts can create content for the electorate that looks for political information online (Howard, Woolley & Calo, 2018). These social actors are built from a variety of automated computer scripts and represent different political strategies. In our dataset we identified two different patterns in their behaviour that we classified as *campaigner* and *inciting agent*.

We defined as campaigners those impersonator bots that endorse a candidate, a politician or a political party, acting in the traditional model of electoral campaign, pretending to be a common online grassroots supporter. It promotes one candidate as the best rational choice based on policy proposals, spreading and highlighting her or his supposed qualities. Campaigners usually criticize the adversaries' performance and skills but rarely attack competitors personally, assuming a moderate and non-aggressive tone in both cases.

We characterized as inciting agents those bots that have a predominantly emotional performance with a dramatic discourse to attack an opponent or to advocate for a candidate as the only possible safe choice or redemption. They usually exaggerate in their diagnosis of social problems spreading moral judgments and negative feelings for affective contagion. Their opponents are not only political personas, but also ideas; a wide spectrum of ideologies and beliefs are considered enemies. The inciting agents are emotional provocateur bots that constantly defame or endorse a political position with irrational and passionate argumentation, making them an effective tool for disinformation and political polarization. The bot's behaviour presents similarities to trolls identified in the Philippines (Ong & Cabañes, 2017), as both types of accounts start quarrels with opponent's and use *ad hominem* attacks as a way of shutting down rival's arguments.

Once these two types of political bots emerged in our coding process, we carefully tested all exemplary bot cases under both analytical categories: campaigner and inciting agent. We constantly performed comparisons both within and across classifications to preserve empirical complexities as well as to maintain a flexible approach in order to observe possible theoretical connections. By scrutinizing our sample, we detected that the majority of our examples fit in one of two categories, which provides evidence that supports our proposition. However, there was only one automated profile in which behaviour was situated within the boundaries of the two political bot classifications, mixing both discursive approaches and logics of action.

There is also a notable finding among user-generated bots, both types of political bots and media spambot: all of them make considerable use of traditional Brazilian news media links in their tweets, presenting a common empirical element. The ubiquity of media outlet links probably has a role in legitimizing the bots' messages. Except for the media spambots, in which the link-sharing behaviour is the core activity, sharing media content helps to camouflage bots' actions and intentions and gives them political pseudo-neutrality. Posting and sharing links is also an easy task for any computer programmer to automate impersonator profiles.

8. Discussion and final considerations

Contemporary politics are being reshaped by algorithms and data analysis, with big data and political bots being recognized as a key factor in electoral strategies. However, during our grounded theory approach, new forms of public opinion manipulation are drawn to our attention. Besides the political bots that perform with the purpose of influencing political discussions, our data presented two new categories of impersonators: the user-generated bot and the media spambot. The use of automated scripts by common people and media companies as a strategy to achieve higher Twitter popularity provides evidence that manipulation is everywhere: left and right-wing parties or politicians, real users, media outlets and the platform owners themselves are trying to take advantage of algorithms to produce convenient data results about themselves and amplify their relevance on social media. Concerning this phenomenon, future research on social media effects should consider social psychology theories (i.e., confirmation bias and tribalism) to examine how online astroturfing impacts the

audience tendency for self-selection biases and the public opinion manipulation, including this discussion on the information ethics sub-field.

Our findings also reinforce the urgency of an action agenda regarding social media manipulation, one that encompasses (1) public regulation to require transparency from online service providers; (2) a new model for content moderation; (3) new approaches to the design of platforms; and (4) safeguards in closed messaging services when they enter into a public space logic (Forum on Information and Democracy, 2020). With the lack of a proper policy framework, the social media business model and the mainstream media emphasis on profits over civic responsibility, make them vulnerable to manipulation but can also turn them into manipulators. On the one hand, automated accounts are used by these companies to spread their news and amplify their public attention. On the other hand, programming bots to post mainstream news media content is useful and convenient for all kinds of social media manipulators, either for giving them credibility or to mask their master of puppets intentions. In any case, our findings reinforce that these new social actors' function via and alongside traditional media (Howard, 2006), and the boundaries between traditional and new media actors remain blurred.

It is also interesting to note that faith in the myth of 'personal opinion', as an opinion 'formed' by a permanent effort to keep informed by truthful sources, can mask the fact that speech is an important field of ideological production (Bourdieu, 2000). Pierre Bourdieu (1993, p. 149) argues that due to our "naively democratic sentiment", there is a general belief that "everyone can have an opinion" and that "all opinions are of equal value". The author refutes these two premises by asserting that "public opinion does not exist" in the sense that most people do not possess the 'political competence' and information literacy to have a political opinion. When people without the necessary skills are obliged to express an opinion – as in the case of political surveys or compulsory voting – they are not able to collect the necessary information to construct it. Hence, they rely on second-hand information accessed in everyday conversations to adopt a socially available opinion, according to their 'elective affinities'. In other words, individuals map others' opinions to identify people with the same "class habitus" (Bourdieu, 2000) reproducing the most convenient available idea.

In this case, bots on Twitter represent a critical social problem as they occupy a vacuum in the supply and demand of political opinions, offering partisan positions for those who do not have it, through online interaction. Users are not empowered to research, debate, make decisions and form critical opinions about the quality of information, its possible applications and the power of the structures that shape the production, organization, retrieval, and dissemination of this information. Finally, although new power structures can emerge on social media and bots work for different political and social purposes, the computational nature of bots claim into service of dominant social groups and economical elites.

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