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Computational Propaganda in Brazil: Social Bots during Elections

Dan Arnaudo, University of Washington



Table of Contents

Abstract.....	3
Introduction.....	3
Setting the scene: A turbulent but vibrant political system reflected online	7
Bots enter a presidential debate.....	12
Impeachment and the electronic campaign that never ended.....	16
The 2016 Rio de Janeiro municipal elections	19
Conclusion: Responses and emerging trends.....	26
References.....	27
Citation.....	38
Series Acknowledgements.....	38

Table of Tables

Table 1: Bot created by UFMG	21
Table 2: Hashtags collected from February 27 to March 27, 2017	22
Table 3: Hashtags collected from May 1 to May 14, 2017	22
Table 4: Six top accounts by number of tweets captured	23

Abstract

Computational propaganda can take the form of automated accounts (bots) spreading information, algorithmic manipulation and the spread of fake news to shape public opinion, amongst other methods. These techniques are being used in combination with the analysis and usage of large data sets of information about citizens held by corporations and governments. This form of propaganda is spreading to countries all over the world, most notably during the 2016 US presidential elections and the run-up to the UK's referendum to leave the European Union (Brexit). This working paper examines the use of computational propaganda in Brazil, the largest country in Latin America and a critical part of the global internet. This examination takes the form of the study of three recent cases of the use of computational propaganda in Brazil: the 2014 presidential elections, the impeachment of former president Dilma Rousseff and the 2016 municipal elections in Rio de Janeiro. It examines the legal framework governing the internet and the electoral process online, particularly how this process relates to computational propaganda. In addition, it seeks to understand how bots are involved in multifarious economic and political themes, and in ongoing debates in the country about corruption, privatization, and social and economic reform. Through a collection and analysis of hashtags related to major investigations into corruption in politics, as well as to proposed reforms to the social support systems and protests related to them, the working paper identifies bots that are involved in these debates and how they operate. Finally, it looks at potential responses to this kind of propaganda, from legal, technical and organizational perspectives, as well as at some indications of future trends in the use of these techniques in Brazilian society and politics.

Introduction

As the internet grows exponentially in size and scope, so does the impact it has on our everyday activities, from our communications to market exchange to participation in political systems. It is changing political discourse throughout the world, while simultaneously the computational systems and the networks that connect them are playing an integral role in shaping elections and debates. The 2016 presidential elections in the United States (Kollanyi, Howard, & Woolley, 2016) and the United Kingdom's vote to leave the European Union (Howard & Kollanyi, 2016) offer two prime examples. In both cases, evidence shows that computer-controlled accounts, or bots, often promoted false or inaccurate information, and played an integral part in propagating information about candidates and campaigns online.

The US government found that Russian state-sponsored computational propaganda played an instrumental role in the 2016 presidential election (U.S. Office of the Director of National Intelligence, 2017), a conclusion that Facebook said its data did not contradict (Weedon, Nuland, & Stamos, 2017). Massive networks of automated accounts, also known as botnets, can be built to manipulate algorithms in major social networks such as Facebook, Twitter and YouTube and can drive users to content supporting or attacking candidates and issues.

However, while these examples provide the most well-known, globally influential accounts of how computational propaganda operates in the twenty-first century, they are not the only types of situations where these techniques are being used. Across the developing world and the Global South, political actors are operating using the same kind of botnets and a wide range of propagandistic tactics online, from the use of large data sets of information about voters to algorithmic manipulation. As the largest national economy, population and territory in Latin America, Brazil is a critical case that can be used to study how these systems and actors operate in a relatively young, developing democracy.

The world's fifth largest populace also dominates the internet in the western hemisphere in a way only surpassed by the United States. It controls much of the backbone network infrastructure of South America, including transatlantic fibre optic cables, international interconnections, Internet Exchange Points and data centres (Arnaudo, 2017). This extends to critical internet resources such as Domain Name Systems, IP addresses, Autonomous System Numbers and other measures of online influence (DeNardis, 2013). It also wields considerable international influence in virtual and physical space as a member of the BRICS group of developing nations and a leader in the Global South. The company that used big data and the manipulation of social network algorithms to promote the Trump (Cadwalladr, 2017a) and Brexit (Cadwalladr, 2017b) campaigns, Cambridge Analytics, has recently bet on Brazil by opening an office in São Paulo (Brigatto, 2017). Clearly, Latin America's biggest democracy is a huge growth market for international political consultancy.

However, it is also mired in long-standing, deeply intertwined political and economic crises. Years of a sprawling corruption scandal known as Car Wash (Lavo Jato in Portuguese) has hobbled the political class, leading to many arrests, investigations and resignations throughout the government. Consecutive years of

recession have tarnished the legacy of the Workers' Party (Partido dos Trabalhadores, or PT) that ruled the country from 2002 to 2016 under former presidents Lula Ignacio de Silva (Lula) and Dilma Rousseff (Dilma). Lula is under investigation for corruption as part of the Lava Jato scheme. While his successor Dilma is not, she was impeached in 2016 and removed from office, supposedly for manipulating government accounts in the run-up to her 2014 re-election. She and her supporters have suggested that her former allies in coalition, now opposition, impeached her because they wanted to stymie the Lava Jato investigation and take power for themselves.

The new government, led by Dilma's former vice president and erstwhile ally Michel Temer, has not stopped the disastrous economic decline or the Lava Jato investigation, which has claimed several of his ministers, allies in Congress and bureaucrats throughout the government. President Temer ran as Dilma's vice president in the 2014 election when his Partido Movimento Democrático Brasileiro (PMDB, or Brazilian Democratic Movement Party) aligned with her Workers' Party in a coalition. This coalition broke up soon after the election, and Temer and his party were thereafter instrumental in her impeachment.

This volatile political environment provides a large, rich and dynamic field for the study of computational propaganda. Parties to various electoral contests in recent years have made increasing use of social networks and the internet in general to organize campaigns and promote their candidates or any given issue, while attacking others (Buckstegge & Stabile, 2016). Simultaneously, in this period Brazil has rapidly adopted social networks as the existing media environment has rapidly shifted. John Perry Barlow, a founder of the Electronic Frontier Foundation, described the situation as follows: "Brazil is an enormous inside joke, and the internet is a mass conversation. Brazil was the Internet before the Internet existed." Barlow distributed all 100 of his early invitations to Google's pioneering social network Orkut to Brazilians, leading to rapid adoption and the largest user base in the world. It remained the largest social network in Brazil until it was overtaken by Facebook in 2014 (Ruvolo, 2014).

This widespread, intense online participation extends to the democratic process itself. The internet and social networks have become instrumental in spreading information about candidates, following news and debates and tracking issues ranging from corruption to pension reform. This same energy contributed to the

creation of a digital bill of rights within the country's constitution that now forms the core of laws governing Brazilian cyberspace, created through an open source, online, creative commons system that crowdsourced the process of drafting the text of the bill. This law, known as the Marco Civil da Internet, or the Internet Bill of Rights, became a model for internet governance for countries around the world (O'Maley, 2015). It provides strong privacy guarantees for all citizens and situates principles such as network neutrality, universal internet access and freedom of expression online in the constitution.

Simultaneously, this vibrancy is overshadowed by instability in the economy, corruption and deep political uncertainty. Computational propaganda in forms such as bot networks, fake news and algorithmic manipulation play key roles in the political system in Latin America's largest democracy. What roles did computational propaganda play in the elections that have shaped modern Brazil, particularly the presidential election of 2014 and the local elections in 2016? How did its users attempt to shape discourse during the impeachment process that ended over a decade of control by the Worker's Party? Does this form of propaganda play any role in shaping ongoing debates about corruption investigations, social reforms and other issues that transcend singular events? How does the legal system, buttressed by the Marco Civil, respond to this kind of propaganda? Are the laws, the media and other actors structured in a way that can monitor these challenges to open, democratic discourse in the networked public sphere (Benkler, 2006) and respond to them?

To begin to answer these questions, this working paper will examine computational propaganda found during three specific political events that engendered intense political debate: the presidential election in 2014, the local elections in 2016 and the impeachment of former president Rousseff in the same year. Secondly, it will attempt to examine underlying, ongoing political issues that have been consistently debated and discussed in society and online throughout this period: corruption in the form of the Lava Jato investigation, social change in terms of the reform of the pension and education systems, and the economic system at the heart of many of these debates. Besides evaluating academic literature tracking these events and issues, it will examine the media systems in which they are situated and how they portray the role of this kind of computational propaganda in society as well as the laws that attempt to govern virtual space.

Interviews with political consultants, academics, journalists and technologists will provide further background information on aspects of how bots and other forms of manipulation work online. Data sets of tweets linked to underlying political issues provide examples of how computers, individually and collectively, are contributing to online discourse. Bots that are identified in the collection will be examined in terms of their content, links, followers and network to show examples of how these autonomous agents operate online. Finally, this working paper will offer some thoughts on how this propaganda could shape the political debates of Brazil's future based on this discussion and data.

Setting the scene: A turbulent but vibrant political system reflected online

As described earlier, Brazil is a centre of raging political debates about the best way forward for a rapidly developing society as its economy sags under the strain of a deep recession. As the country hosted the World Cup in 2014 and the Olympics in 2016, the economy stalled and shrank, leading to rising unemployment and attacks on the leading Workers' Party, which had held power under Presidents Lula and Rousseff since 2002 ("GDP per capita growth (annual %)," 2017). In over a decade in power, the centre-left party had pushed for policies that supported large-scale social programmes such as the Bolsa Familia, which provided subsidies to poor families to buy food and other necessities. It was generally supported by an upswing in economic fortunes, which was bolstered by a commodity boom that fed markets across Latin America, Africa and Asia.

The political system is fragmented. In 2014, the number of political parties in Congress grew from 23 to 28, one of the highest numbers in the world. Governments must work in a coalition of many, which has always made for an unstable political environment. Besides Lula and Dilma's PT and Temer's PMDB, there are also the Social Democracy Party of Brazil (PSDB), the Party of the Republic and the Progressive Party that now rule in coalition (de Melo, 2015). Altogether, at the time of writing in May 2017 there are 20 parties in the alliance of the current government in the lower Chamber of Deputies, another measure of the diverse factions within the political system. In the upper house, 17 parties are represented in the Senate. Coalition governments are the norm, but they also lead to situations such as in 2014, when the president recruited a vice president from another party which later became the opposition.

Before this rupture, the PT had held power since 2003 in coalition with other left- to centre-left-wing parties, and oversaw a rapidly growing economy that contributed to its success. After President Lula ended his second term under term limits, his successor President Rousseff served from 2011 and stood for re-election in 2014 against candidates including Aécio Neves of the PSDB and Marina Silva of the smaller Brazilian Socialist Party. Despite winning the election, increasing protests, fuelled by online campaigns for her impeachment, alongside the deteriorating economic situation and increasing opposition from her coalition partners, ensured that opposition continued to grow. This combination of factors led to her suspension from office in May 2016 and full impeachment in August, when she was replaced by her vice president, Temer (Romero, 2016).

The debate over the reasons for impeachment amplified major fault lines in society over the future direction of the country. There is ample evidence in terms of recorded conversations between Temer and his allies in Congress and the government, many of whom became ministers, which shows that they conspired to take down President Rousseff to thwart the Lava Jato corruption investigation that increasingly touches all the major players in government (Greenwald, 2016). The sprawling investigation focuses on payments made to fund political campaigns and secure contracts, particularly for major infrastructure projects.

During the early part of the twenty-first century, Brazil's economy represented a major success, creating growth and lifting many people out of poverty. However, it also created huge new opportunities for investment, from oil exploration by the state firm Petrobras to massive infrastructure projects supporting the 2014 World Cup and the 2016 Olympic Games. It is increasingly evident that to secure the contracts to build, service and profit from projects such as these, massive payments were made at all levels and branches of government ("Irredeemable?," 2016). The investigation began by examining a small money-laundering operation at a petrol station, but has grown to touch many of the political and corporate elite, including the head of the largest construction firm in Latin America, former president Lula, Congressional and Senate leadership, and now President Temer himself (Padgett, 2017).

These political actors are operating in a corporate media market dominated by large monopolies. The Globo Network, a media group with properties in television, radio, print and online, dominates almost all sectors. Its television station is the highest rated in the country and controls most advertising revenue, with 122 affiliates, an international version and the ability to export its productions worldwide (Mango, 2014). It also controls the Brazilian newspapers with the second and eighth highest circulation, *O Globo* and *Extra* respectively (“Maiores jornais do Brasil,” 2015), and a large network of radio affiliates throughout the country. Its online portal, G1, bolsters this network, reporting over 50 billion page views since its inception and 46.3 million unique visitors per month in July 2016 (“G1 completa 10 anos com pioneirismo entre os sites de notícias,” 2016).

Its major rivals are the UOL network, supported by the *Folha de São Paulo*, the third largest newspaper in the country, and smaller television and radio networks such as Bandeirantes, Record, Rede and SBT, which are all family owned. However, no other network plays such a central role in print, television, radio and online as Globo, itself a family business since its founding by Robert Mourinho in 1963 (Mango, 2014). Media devoted to politics is small and targeted at an elite readership, with online portals such as Intercept Brazil, Jota and Nexo alongside corporate magazines such as *Istóe*, *Veja*, *CartaCapital* and *Piauí*. The international press has Portuguese versions with Brazilian correspondents and some local bureaus such as the BBC, *El País*, DeutcheWelle, TV5, BuzzFeed and Vice.

As in almost every other country in the world, traditional corporate media networks are being overtaken by the internet and more informal, alternative information sources spread through social networks, email, personal messaging systems or other online means. Facebook is by far the dominant social network, followed by WhatsApp, Google+, Instagram, Skype, Twitter and LinkedIn. YouTube is almost as popular as Facebook as a social network, but in terms of time spent, Facebook is the overwhelming favourite (We are social Singapore, 2017). One estimate by ComScore, a global marketing and data analysis firm, suggests that Brazilian users spend over 95 percent of their social media time on Facebook (Banks & Yuki, 2014).

Political parties have made use of modern campaign strategies and taken to social networks, using them to promote their messages and attack opponents. Since at least the 2010 presidential elections, companies have made use of modern online propaganda campaigns driven by big data, often in concert with automated

systems, to promote content (Rebello, 2014). A political scientist interviewed commented that in his view, US President Barack Obama's campaign in 2008 demonstrated how these techniques could be used, and were widely replicated. Regarding the use of automated accounts or bots, he noted:

The use of bots is not something that just came about, they have been working for at least six years here in Brazil, and now it is becoming more common. Now the bots are becoming more sophisticated, the technology is becoming more sophisticated, such as cyborgs that are a mixture of human and bot, something more efficient than bots.

Driven by major protests in 2013, new alternative media sources have sprung up, most notably Midia Ninja, which spread videos and other information about the opposition to the government (Watts, 2013). These protests started in response to rising bus fares in Rio and São Paulo but quickly grew to encompass anger at the rising costs of public services, corruption and a host of other issues. In contrast to the narrative created by traditional media such as Globo that these were protests led by a minority of anarchists, Midia Ninja and other alternative media groups exposed police brutality and the true breadth and nature of public support at the time. These protests grew to include millions, numbers that were unprecedented in Brazil since before the advent of the commercial internet, and the groups spread viral videos and messages on Facebook, YouTube, WhatsApp, Twitter and several other social networks with methods that set a pattern for large-scale protests that were to follow (Santoro, 2017).

Internet penetration, while uneven and broadly confined to mobile access, has supported this movement, increasing rapidly in the past two decades. The International Telecommunications Union reported that 59 percent of Brazilians used the internet in 2015 ("Percentage of individuals using the Internet," 2016). Only 26 million broadband subscriptions for a population of roughly 200 million suggests that there is still a gap in fixed line, computer-based access, but 250 million cellular subscriptions demonstrate how almost every citizen is increasingly online through mobile access (International Telecommunications Union, 2016). This follows a global pattern, suggesting that almost everyone will be connected to the internet by 2020 (Woolley & Howard, 2016).

The country is also confronting a deep legacy of dictatorship. Brazil is a relatively young democracy, having only emerged from decades of military-backed authoritarian rule in 1985. Surveillance infrastructure and methods online are not well documented, but the government maintains aspects of its dictatorial legacy, including federal and state military police that have a history of working in direct cooperation with the armed forces, and a Brazilian Intelligence Agency (ABIN) that remains under direct control of the military (Figueiredo, 2016).

The government also created a Cyber Defense Center (CDCiber) in 2012 to unify the command and control systems of various government agencies with responsibilities for security in cyberspace under the authority of the military (Bernardo, 2014). It inaugurated this system with the special aim of coordinating responses to large-scale events such as the United Nations summit in 2012, the Pope's visit in 2013, the World Cup in 2014 and the Olympics in 2016 (Canabarro & Borne, 2013). The CDCiber group has been tracking protests online in various forms and has led various commentators to question its role in tracking online debates and those involved in protests (Muggah & Thompson, 2016).

Cybercrime is a major issue in the country. In 2016, Symantec, a major multinational cybersecurity firm, reported that Brazil hosted the eighth highest number of bots in the world, according to data collected from its systems ("2016 Symantec internet security threat report," 2016). The Spamhaus Project, a consortium that monitors networks worldwide, says it found 485,133 bots on the networks it monitored on 17 May 2017, fourth in number after China, India and Russia, South Africa, the other BRICS ("The top 10 worst botnet countries," 2017). The Brazilian Computer Emergency Response Team (CERT) network of private and public entities responsible for security online throughout the country reported over 700,000 attacks in 2015 and over 1,000,000 in 2014, the year of the World Cup ("Estatísticas do CERT.br -- Incidentes," 2017). Besides the sheer scale of Brazil's virtual space, large-scale piracy of operating systems and server software and organized criminal groups all contribute to the creation of fertile ground for botnets and other forms of criminality online.

Bots enter a presidential debate

Events surrounding the 2014 presidential elections provide some of the earliest and well-documented cases of how botnets play a role in the political system. President Rousseff was up for re-election after her first five-year term, and after failing to win 50 percent of the vote in the first round, faced off in a second-round run-off against centre-right candidate Aécio Neves. Earlier reports showed that candidates in the first round, including a senator who later died in a plane crash, were supported by botnets. Various articles at the time, backed by research done by the Federal University of Espirito Santo, showed that bots were operating to promote both candidates. This activity spiked particularly during debates between the two run-off candidates, Rousseff and Neves. Reporting done by *Folha de São Paulo* and backed by a research group from the university showed that within 15 minutes of the start of the television debate, tweets with hashtags related to Neves and the debate tripled in number (Aragão, 2014).

This kind of abnormally rapid rise in support is a strong indication that bots were being used, especially when rival hashtags supporting President Rousseff did not increase at anywhere near an equivalent rate. Shortly after, in October 2014, her online supporters group Muda Mais reported a list of over 60 accounts it said were automated to retweet Neves' account over 180 times each (Liberato, 2014). Her party documented various acts of accounts that appeared to be automated on Twitter, Facebook and other social networks attacking Dilma and supporting Neves, including the cases documented by the *Folha de São Paulo* and Muda Mais. They were linked to a businessman that received \$R130,000 (Brazilian reais) to support the campaign. The campaign sought fines under the electoral law of between \$R5,000 and \$R30,000 (Umpierre, 2014).

Campaigns are prohibited from paying for the propagation of campaign materials on social media during the election, but private companies or individuals can still operate in this fashion if they are not directly connected to a campaign. A "mini reform" of the electoral law in 2015 ensured that restrictions on this form of "electoral propaganda" was prohibited on the internet and specifically on social networks ("Altera as Leis do Código Eleitoral", 2015). Even in 2014, the law said that campaigns cannot pay to promote their causes directly on the internet during the election, nor can they promote them through social networks. It also said that any accounts promoting messages within a campaign must be operated by "natural

persons” (Toffoli, 2014). However, a political consultant who was interviewed suggested that the law is inadequate to the task of monitoring infractions because it is restricted by the limitations of private parties operating on behalf of campaigns and ultimately is behind the pace of technological development. An interviewee who is a political scientist studying the use of bots in campaigns commented:

One always has to run ahead of these innovations in communications that are evolving, faster all the time. Each election you have a new law about campaigns (...) It is very dynamic, you make a new regulation, and new law, six months later a new technology is developed which can frustrate the system. (...) There is also the problem of private networks such as WhatsApp, where there is no way to monitor them.

Rousseff’s campaign also used bots, but not on the scale used by Neves, as was later confirmed by leaked internal party memoranda published in the *Estadão de São Paulo* after the election (Filho & Galhardo, 2015). The memoranda covered the use of bots during the campaign, stating that Neves’ operation used them not only on Twitter and Facebook, but on WhatsApp, and that it spent an estimated \$R10 million in purchasing and deploying these within the social networks and private messaging application.

The political consultant with experience of the campaign who was interviewed confirmed that WhatsApp was indeed a popular messaging system for pushing political messages. She described how a campaign would develop identities in private groups to push automated political messages or articles generated on public networks such as Twitter and Facebook. In her campaign, one person would operate roughly 250 accounts to push the same messages throughout these networks; much of the automation was internal. Conversely, these accounts were also used to measure the impact of communication campaigns and capture the “mood” of the network, such as topics frequently discussed and positions adopted.

A public company known as “Brasil Liker” sells likes that come from Facebook accounts registered in Brazil. Likes for Facebook pages cost R\$4.99 for 50 and R\$200 for 3,000, while for posts, clients could gain 10,000 for only R\$90 (“Brasil liker,” n.d.). These figures give an idea of how inexpensive these services could be, especially when automated or even outsourced to other countries, such as China or India.

The 2014 memo reported that this spending continued after the campaign had ended, to support groups on networks such as Facebook that opposed President Rousseff. It estimated that 16 million joined Revoltados ON LINE (Revolted Online), one opposition Facebook group, and another 4 million joined another known as Vem Pra Rua (Go to the Street). The site of the ruling Workers' Party had only 3 million engaged in a similar period, and the memo noted this discrepancy, stating that this investment "got a result", with content from these opposition sites reaching roughly 80 million people while sites related to the ruling party and the presidency reached only around 22 million. "If it was a football match we are entering the field losing 8 to 2", the report concluded gloomily (Filho & Galhardo, 2015).

This was partly because the Workers' Party bots were now part of the presidency. A Brazilian researcher who has worked in online democratic campaigns described what happened once the election was over as follows:

After the election, all the servers and bots of Dilma's campaign were turned off or they went to work for the presidency, which means that they had rules to follow, because they were working for the president's cabinet, and the other bots didn't have rules to follow.

In the view of the ruling party, the Neves campaign and its allies never disconnected many of the key components of the online campaign machinery, the raw materials of computational propaganda, and this had a major effect on the strength of the social movement that was then driven to oppose the president, her party and their agenda. The online electoral campaign never ended, and these networks became key tools for generating support for impeachment.

The case of the 2014 Brazilian presidential election generates several interesting and important findings for the study of computational propaganda. It shows the weakness of electoral and other cybercriminal laws in combatting the use of this technology online, as well as the inability of parties to understand and combat botnet activity that is not necessarily explicitly connected to the opposition. It also demonstrates how modern campaigns link together various social networks in a coherent strategy, using WhatsApp groups to drive people to more public forums on places like Facebook and Twitter. The campaign memo indicates that the

amount of money required to create large social groups and massive streams of content while engaging users across platforms is quite small relative to the size of the return.

Finally, this election demonstrates the ability of campaigns to persist beyond the formal limits of the election, in contravention of the intent if not the actual language of the electoral law, and after the end marker of the election day itself. Just as the internet allows campaigns to reach people in more personal ways than candidates and parties were able to in an age of mass media governed by television, newspapers and radio, it also allows political actors to continue to pursue their political objectives through computational or traditional propaganda beyond conventional limits.

On one level, these groups target people using vast troves of data they have collected about what they like, who they follow, demographic information and information about their group of friends and acquaintances and their family. On another, the campaign machinery can use its personal connections to get access to voters, often through social networks such as WhatsApp or Facebook that are designed to be closed to circles of people that are directly connected to users in some way. During the presidential election in 2014, this created a powerful mechanism whose power, visibility and range were boosted by botnets in various ways that were well documented both during the election and after it.

This system, honed during the campaign, coupled with a lack of any limitations to obstruct the ruling party's objectives, also helped lay the groundwork for the impeachment campaign that followed shortly after President Rousseff's second electoral victory in October 2014. Indeed, this online energy grew directly from a movement funded during an election by donors that were now able to channel these resources and throw new ones into the next phase of propaganda. This second phase proved the campaign had never completely paused online once the election was over. In reality, the opposition to the ruling party and its government was only getting started.

Impeachment and the electronic campaign that never ended

Modern, large-scale protests had already become an entrenched part of Brazilian political culture since the events of June 2013. In contrast to earlier manifestations, such as those that preceded the impeachment of President Fernando Collor de Mello in 1992, these protests were also the first on a national scale to make use of the internet and social networks (Waldram, 2013). It is also notable that they were not backed by any political party or trade union, as all major political manifestations had been since the return of democracy in 1985 (Santoro, 2017).

At that time, protests against rising bus fares exploded to become widespread, multifarious political manifestations of millions of people throughout the country. These protests were partly linked to the Confederations Cup and the exorbitant amounts being spent to support the construction of stadiums and infrastructure for the World Cup in 2014 and the Olympics in 2016. Many felt that this expenditure was made without consideration for the real needs of the population, lining the pockets of politicians at the same time. The protests that arose were massive but also unconnected to any party, or ultimately any singular issue, spanning corruption to health, safety and education reform, as shown by analysis of hashtags on Twitter at the time (Cardoso, Lapa, & Fátima, 2016).

This movement provided the template for what was to come, including sporadic political protests during the election process in 2014. However, these generally fell within the scope of the traditional political manifestations, party rallies and meetings. After the elections, as catalogued by the PT memo and confirmed by interviews, the machinery of the opposition remained in place and was connected to two Facebook groups, Revoltados ON LINE and Vem Pra Rua. A communications professor studying social networks indicated that based on data he had collected, the calls began for impeachment immediately following the election, in November 2014.

Many of these activities, actors and pages on Facebook also have Twitter and vice versa. So, it's very interesting that there is this historical connection, this continual line between impeachment and the post electoral movement in 2014; it is concrete.

They were joined by other groups such as Movimento Brasil Livre (Free Brazil Movement) and Endireita Brasil (Righting Brazil) in calling for organized opposition, which began to coalesce. The same group of researchers from the Federal University of Espírito Santo that had identified bot activity during the television debate and the campaigns in 2014 reported botnet activity in early March 2015. This called for protests against the president, and even for impeachment. The researchers collected images published on Twitter related to the hashtag #VaiaDilma (Scream Dilma) (Goveia, 2015).

In their analysis, the researchers found evidence of bots both calling for opposition to President Rousseff and supporting her. Protests reflected activity on social media, the motivation of the opposition to Rousseff and the much weaker position of her supporters. A protest in support of the president on 13 March was said to consist of anywhere from 33,000 to 175,000 supporters, depending on organizer or police estimates respectively (“Más de un millón de brasileiros protestaron contra la presidenta Rousseff,” 2015). Either way, these numbers were exceeded by a protest of over a million people in São Paulo and thousands in other cities two days later. Another data collection completed at the same time for hashtags related to the impeachment protests showed that the most retweeted messages were generated by bots (Oliveira, França, Goya, & Penteado, 2016). Interestingly, in an analysis comparing the networks of images formed in 2013 and 2015, researchers found such clusters much more defined in that the interconnections and related groups were demarcated in support of or in opposition to the president. The communications interviewed specializing in social network research commented on how both bots and real partisans could heighten this dynamic:

There exists a kind of human character in robots and a kind of robotic character in humans; there is a mono-thematization of their timeline. If you enter into the timeline of a bot, it will be speaking within a defined context. For example, yesterday there were protests in Brasilia, [but] it will be speaking continually of information such as Lula in Jail, vandalism, etc.; they are speaking only of one theme. This is not the style of a real user who doesn't participate in political topics, that will speak of various subjects. [...] However, a partisan political supporter or militant, will also have mono-thematic timeline, talking continually around the same subject over a large volume of tweets.

In 2013, the hashtags suggested the disorganized, multifarious nature of the issues that brought people onto the streets. In 2015, the battle lines had been drawn, partly with robotic help, and these trends would increase for the rest of the year (Côrtes, Ziigoni, Cancian, & Malini, 2016).

Successive protests followed in April, August and December 2015, when largely anti-government protestors again brought millions onto the streets (Sulleiro, 2015). These continued in 2016, especially in March and April, when protests faced off on successive days, sometimes even on the same day. A major protest occurred on 18 March, this time in support of President Rousseff. A data collection at the time of tweets with the hashtag #VEMPRADEMOCRACIA (Come for democracy) showed significant bot activity in favour of Rousseff as well as against her. They also observed that a significant amount of organization occurred on other networks, particularly private ones that could not easily be monitored (Malini, 2016). The popularity and overwhelming use of Facebook is confirmed by various subjects interviewed for this working paper and social networking surveys of Brazilians (Banks & Yuki, 2014).

The information environment had become particularly polarized, mirroring events that were happening in places like the United States and Europe at the same time. Researchers at the University of São Paulo surveyed attitudes of 571 protestors at the April 2015 protests and found that they did not trust any of the major political parties or trusted them very little (Ortellado & Soltano, 2016). The effects of fake news were also found: 64 percent of respondents thought the PT wanted to create a communist regime and 53 percent that a drug gang represented the armed wing of the party. Mirroring Donald Trump's accusations about fake voting in the US, 43 percent believed that the party had brought 50,000 illegal Haitian immigrants into the country to vote in the 2014 elections. Months later, at a protest supporting Rousseff in 2016, the researchers found that 57 percent believed that the United States had fomented protests against corruption to get at Brazil's oil, and 56 percent believed that the judge leading the Lava Jato case, Sergio Moro, had a connection with the PSDB (Albuquerque, 2016). These facts were demonstrably false but were widely shared on social media (Desidério, 2015).

Rousseff's government ended on 12 May 2016, when she was suspended by the lower House of Deputies and replaced by her vice president, and now enemy, Michel Temer. Ultimately, several factors, ranging from the struggling economy to

widespread corruption to souring public opinion against all politicians, had helped to end her administration early. There is no doubt that social networks played a key role in developing this narrative and organizing the protests. Within the online landscape, bots had played a role from the beginning, and never stopped in their electronic opposition to her administration, possibly a key factor in the speed of her defenestration.

The 2016 Rio de Janeiro municipal elections

Municipal and state elections are often harbingers of what is to come on a national scale. They are where political campaigns test out new tactics in local environments: there is less scrutiny and they are often able to get away with more. A campaign consultant interviewed for this working paper commented that in 2016, a kind of hybrid, cyborg automation became popular in her campaigns. What was known as “doe um like” (donate one like) was a feature in which a candidate’s official campaign asked for supporters to “donate” the capacity of liking and sharing content from their personal profiles on Facebook for a three-month window. Once the supporter clicked on a link and agreed to make this “donation”, the tool captured their profile’s ID and password. Profiles of real people started to follow automated tasks and joined the candidate’s army, a kind of cyborg botnet. She suggested that this tool was often only offered to one side, and argued this was decisive in the result of the elections in many municipalities.

In the elections for mayor of Rio de Janeiro in 2016, botnets appeared to be particularly active in the campaign. Marcelo Crivella, the right-wing leader of an evangelical mega-church, and Marcelo Freixo, a state representative, professor and member of the left-wing Socialism and Liberty Party, faced off in the final round. Both candidates accused each other of spreading online rumours and complained to elections authorities and in public debates about rampant fake news. Stories shared included one claiming that Crivella would privatize and charge for access to public parks and another that stated that Freixo would legalize marijuana and abortion. Both candidates created websites to denounce these rumours and Freixo entered a legal action against Crivella (Schmidt, 2017). They also used WhatsApp, particularly Freixo, who had less exposure on television, but legal scholars criticized the anonymity of the network and the lack of specific laws addressing its use in the spread of false information (Couto, 2016).

Researchers at the Federal University of Espirito Santo found a botnet of 3,500 accounts on Twitter attacking Freixo with repeated messages with the same phrase, often posting 100 or more times per hour. They used the hashtags #freixista (Freixo supporter), and according to the research group this is more likely to have been to create trending topics against the candidate (Albuquerque, 2016). Ultimately, Crivella won the campaign, denying any connection to the botnets or the spread of rumours. As in the cases found in the presidential campaign, while such activities are prohibited by the electoral law, it is very difficult to prove automation, or when found to make connections between actual bots and the campaigns. Much of this activity again centred on private or semi-private networks such as Facebook, WhatsApp and YouTube, which are much more difficult to track, monitor and report than open networks such as Twitter. As on a national level, fake news, automation and other computational propaganda tactics used by the presidential campaigns can be identified.

Brazilian computational propaganda in ongoing debates

Underlying these distinct political events are ongoing debates, particularly ones centred around corruption in government and reform. These proposed reforms are linked not only to the political system but also to education, pensions and other publicly funded goods. Citizens are justifiably angry that the entire political class appears to be caught up in a consistent pattern of bribes for access to public contracts in exchange for campaign funding, amongst other schemes, while the government remains unable to balance the budget and support basic public services. These issues are reflected in conversations in social networks, especially when these issues come to a head in the form of events such as strikes, public protests, investigations or political scandals. Interestingly, bots are playing roles in these thematic debates as well, often going undetected for long periods of time.

Brazilian experiments in automating social network influence

Researchers at the Federal University of Minas Gerais created two fake accounts to understand how bots could infiltrate social networks, gain followers, spread messages and interact with real people (Messias, Schmidt, Oliveira, & Benevenuto, 2013).

Table 1: Bot created by UFMG

	<ul style="list-style-type: none"> ▪ Nova jornalista bem profissional. Feliz d+. Obrigada a todos pela força. http://go.o.gl/R5kQ9K. Contato: (31)9125-7422 bjs¹ ▪ Rio de Janeiro ▪ Joined November 2011
<p>Carina Santos @scarina91</p>	

The experiment began in 2011, and one bot is still active at the time of writing in May 2017, with nearly 2,000 followers.¹ The first account, now deactivated, only followed users and did not interact, but did gain some followers, tweets, messages and interaction. The second bot tweeted and retweeted based on a predetermined algorithm and gained many followers, nearly 2,000 of which persist in May 2017, although the account stopped tweeting on 25 June 2016, when the research group announced its paper with a tweet. The account is

not based on a real person, but posed as a young Globo journalist disseminating news articles and other tweets. It also reacted to others automatically, gaining responses from celebrities and other popular accounts, including a football announcer, a host of *The Voice Brasil* and a mixed martial arts fighter (Messias, Schmidt, Oliveira, & Benevenuto, 2015). This research suggests the ease with which bots can fool and engage people of all kinds in Brazilian society, multiplying their ability to reach large audiences through influential followers and automated messaging.

A study of Tweets on corruption, "Car Wash", pension reform and strikes

For this working paper, two collections were made of hashtags related to ongoing political themes including corruption, reform, political protest and economic issues. The first collection was made from 27 February to 27 March 2017 and 281,441 tweets were collected from 82,575 users. The hashtags, noted in Table 2 with translations in parentheses, were generally associated with the themes of corruption, the Lava Jato investigation and protests around those issues.

¹ <https://twitter.com/scarina91?lang=en>

Table 2: Hashtags collected from February 27 to March 27, 2017

<p>General Corruption: #corrupção, #corrupcao, #corruptos, (corruption, corrupted)</p> <p>Lava Jato Hashtags: #Lavajato, #Lava_jato, #lavajatointocavel, #operação_lava_jato, #somostodosmoro, #moro, #LavaJatoEuApoio, #Odebrecht, #delação, #SergioMoro, (Car Wash, Car Wash untouchable, operation Car Wash, we are all Moro, Moro, I support Lava Jato, Odebrecht, accusation/censure, Sergio Moro)</p> <p>General Protest: #vemprarua, #VemPraRuaBrasil, #acordabrasil, #nasruas (come to the street, Come to the street Brazil, wake up Brazil, in the streets)</p>
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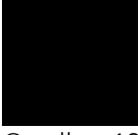
The second collection was more targeted and lasted for two weeks from 1 May until 14 May 2017. It collected 80,691 tweets from 33,046 users focused on a strike that was called on 30 April and generated major public attention, as well as on the 1 May “May Day” protests and events celebrating the “Day of the Worker” in Brazil. The strike attracted peculiar, possibly automated support from an unlikely place after a Portuguese hashtag related to the opposition to the strike (#AGreveFracassou, or the weakened strike) began trending in India (“Como #AGreveFracassou chegou aos trending topics na Índia?,” 2017). Simultaneously, Congress debated a major reform of the pension system that would raise the age of retirement and allow companies to hire people with much less onerous unemployment, pension, healthcare and other benefit requirements. The strike had been called in response to these reforms, while various protests in the streets and online focused on them. As a result, the general protest terms were included again.

Table 3: Hashtags collected from May 1 to May 14, 2017

<p>General Protest Terms: #vemprarua, #VemPraRuaBrasil, #acordabrasil, #nasruas #foratemer (come to the street, Come to the street Brazil, wake up Brazil, in the streets, get out temer)</p> <p>Strike Terms: #BrasilemGreve #greve #grevegeral #BrasilEmGreve #AGreveFracassou, #euvoutrabalhar #GreveNao (Brazil on strike, strike, general strike, Brazil on strike, The weakened strike, I will work, No strike)</p> <p>Reforma da Previdência/May Day: #DiadoTrabalhador #DiadoTrabalho #reformaprevidencia #reformadaprevidência #reformatrabalhista #Previdencia #PrevidênciaSocial #Terceirização #NenhumDireitoaMenos #Reformas #PEC287 #TerceirizaçãoNÃO #TerceirizaçãoSIM #NãoÀReformaTrabalhista #NãoÀReformaDaPrevidência #SimÀReformaTrabalhista #SimÀReformaDaPrevidência (Day of the worker, Day of work, pension reform, worker reform, pension, social pension, Outsourcing, Outsourcing Yes, Outsourcing No, No to the worker reform, No to the pension reform, Yes to the Worker Reform, Yes to the Pension Reform)</p>

From these collections, six accounts were chosen as likely bots based on the high frequency of their tweets in the selected data-capture periods, the type of system they used to tweet, the content of the tweets and their score in an application called “Bot or Not” developed by the University of Indiana to test for bot activity. Table 4 shows basic information related to the collected accounts.

Table 4: Six top accounts by number of tweets captured

Account	Created Date	# Tweets Historically	# Tweets in Captures	Following	Followers	Likes	Bot or Not Score
 @LavaJatoNews	22/10/16 11:00	271K	8,132 (43)	1,214	5,196	391	55%
 @br45ilnocorrupt	24/3/17 1:56	215K	3,365 (589)	22.8K	29.6K	108K	49%
 @2374Costa	1/5/17 11:00	3,143	1,339	34	58	0	67%
 @ktrem10	15/7/12 15:32	254K	1,058 (80)	1,704	3,135	41K	27%
 @stelles_13	5/7/09 19:59	220K	740	3,512	7,421	824	50%
 @Wudson_	17/9/13 12:52	344K	633 (5)	7,580	8,140	126	60%

The top two accounts, @LavaJatoNews and @br45ilnocorrupt, generated the most tweets in the collection from 27 February to 27 March 2017 and have the highest number of tweets captured, partly because of the longer period. The other four accounts were principally collected during the period from 1 May to 14 May 2017. Four of the six accounts were found in both collections, either because they

contained the hashtags associated with general protest or because they posted ones related to both captures. All the accounts focus on corruption in different forms; three have names or account images related to the subject, while others mention it in different hashtags or tweets.

The @ktrem10 and @stelles_13 accounts generally post information protesting about the current government of President Temer, with hashtags such as #ForaTemer (Get out Temer), while @br45ilnocorrupt's name suggests that it is against former president Rousseff. The number 45 symbolizes the 45th president, Rousseff, and the integration with the word Brasil and corrupt emphasizes the blog's support of right-wing parties and opposition to her. Interestingly, this account tweeted many times in both data collections, over 3,000 in the first and almost 600 in the second, suggesting the wide range of topics it connects to, from the general strike of 8 April (#GreveGeral) in the second capture to the Lava Jato investigation (#LavaJatoEuApoio) in the first.

The account that is most likely to be a bot is @2374Costa, which is the same text, composed of hastags (#RT #QuintaDetremuraSDV Índia #GostoDe #NaoTemCoisaMelhorQ #GreveNAO #PuniçãoParaVitoria #MeOdeiaMas) followed by a link to a "like factory" website where users can purchase bots to like or follow their accounts on Twitter and Facebook. It has a 67 percent Bot or Not score, the highest of the set. This is probably a commercial service making use of popular tags to drive traffic to its product.

Two accounts are focused more pointedly on corruption, @LavaJatoNews and @Wudson_ , and both use automatic posting systems, Auto Post Viper IT and dlvr.it. They are also both rated highly (55 percent and 60 percent respectively) as likely bots. However, they both use the accounts in different ways. @LavaJatoNews mostly retweets or sometimes quotes a retweet based on hashtags such as #Odebrecht, the largest Brazilian construction firm currently at the centre of the Lava Jato scandal concerning pay-offs to politicians. @Wudson_ generates only original tweets and does not interact with others through retweets. The account parses the source, hashtags and headlines related to corruption and creates a link it can track through dlvr.it.

The two left-leaning bots also take different approaches. @stelles_13 is a more standard automated system. It is rated to be 50 percent bot and uses If That Then

This, a popular applet that automates programmed actions across platforms. For instance, if a Gmail or a Google news alert is received by a user, then a tweet is sent out. This is probably the type of command that is scripted here; tweets are original but consist mostly of a link, the headline text and two or three tags related to opposition to President Temer. The second (@ktrem10) is more complex, being a mix of retweets, quoted tweets and some original content. Many tweets have the same string: “#MafiaGolpista @RedeGlobo @UOL @abraji @Globonews @Bandtv @sbtonline @recordtvoficial #JG @g1 #Previdencia” followed by a link to an article, or a retweet, or the quote of another tweet. The hashtag #MafiaGolpista signifies “the coup mafia” and the accounts are all media organizations, followed by the “pension system” hashtag.

Sometimes, there are different original texts, such as on 2 May 2017 when it tweeted “@CFOAB se posiciona oficialmente contra a reforma da #Previdencia #sbtbrasil #jornaldaband @jornaldarecord #JN @g1” (The Federal Council of the Brazilian Bar Association positions itself officially against the reform of the pension system) followed by hashtags related to the reform and major media organizations, followed by a link. This is a phrase that does not appear to have been repeated in the data set. One reason for this could be that this tweet was generated from a story appearing elsewhere, but another could be that an actual user generated this text, which would make this a kind of cyborg account using both automatically generated and human-generated content. The account always uses the traditional Twitter Web Client rather than automating applications, and has a 27 percent Bot or Not score, suggesting some level of human intervention or an algorithm that successfully masks its robotic nature.

These accounts show the wide range of tactics used to promote different political topics, some for over seven years, some for less than a month, generally to drive traffic to articles and issues, but sometimes for purely commercial reasons. All of them, apart from the commercial bot (@2374Costa), are relatively popular, with thousands of followers each, although many of these followers may themselves be bots. @br45ilnocorrupt is especially suspect, attracting almost 30,000 followers in less than two months of existence. Overall, they demonstrate several different tactics for driving traffic and gaining followers, from retweeting repeatedly to using specialized automation software and spreading articles from a wide range of news sites. Harnessed collectively in botnets, these kinds of techniques could gain

significant followers and create large-scale support or opposition for a wide range of issues.

Conclusion: Responses and emerging trends

As shown in these cases, the legal system has struggled to keep up with the use of computational propaganda in Brazil. Interviews with campaign consultants and case studies show that while the law prohibits any electoral propaganda within three months of the election, this is extremely difficult to control. Private individuals can always offer their support for campaigns, spreading rumours or other kinds of fake news, and these accounts are often automated using bots at local and national levels, despite the requirement that all accounts related to the campaign be associated with “natural persons” (Toffoli, 2014).

The computational propaganda tactics used during the 2014 election did not stop after the election of former president Rousseff. These methods were used to drive people to groups opposing her and her party’s agenda, which in turn led to calls for her impeachment, ultimately achieved in October 2016.

Proposals for laws currently germinating in Congress could provide responses to the use of bots. One proposal, known by its nickname “PL Espião” (the Big Spy Bill), would require all internet companies that wish to operate in Brazil to collect data about users, including their name, email, address and national identity number. It is difficult to imagine how this system would be developed or enforced, but if this law were implemented it would have major implications for the privacy sections of the Marco Civil and would make more user data at risk of exposure. However, it could also have the effect of making it much more difficult to operate bots, as each Brazilian account would require a real, identifiable person associated with it. Accounts that do not abide by these terms could be more quickly removed. There is also the need for stronger data protection law, which would provide regulations for private and public entities that store vast quantities of voter data as part of their core functions (Grossmann, 2016b).

The Lava Jato investigations illuminating corruption at the heart of the political system remain a potent focus of bots throughout Twitter, as evidenced by the bots discovered in the data collections. Interestingly, one response developed by researchers comes in the form of a bot that tracks spending by Congressional

leadership. Named Rosie after the robot housekeeper in the cartoon *The Jetsons*, this bot is operated by a project known as “Operation Serenade of Love”, which is a reference to a 1990s case that caused the resignation of Sweden’s deputy prime minister for using a state credit card for private expenses (Kinzer, 1995). Rosie tracks the deputies’ requests for reimbursements of expenses and automatically checks the prices and accounts, formulating applications for investigation if there are suspicious data (Mendonça, 2017).

Rosie has a Twitter account² that reports her activity, alongside a project website³ and a Facebook page,⁴ to encourage transparency in its operation. This is a notable example of how Brazilians are attempting to use bots to fight corruption and change political norms; already it has found egregious examples such as a deputy filling up his car 30 times a month on average, another requesting a meal costing R\$6,205, and that 219 deputies simply request the maximum amount every day. Such initiatives promoting transparency, when coupled with a new freedom of information law that mandates publicly accessible data, could drive further anti-corruption initiatives (Lei de Acesso à Informação (LAI), 2011).

Certainly, after years of scandal, Brazilian society is taking a hard look at a complete reform of its political system. In May 2017, with the Lava Jato scandal widening, police released a recording of President Temer organizing bribes for the imprisoned former head of the Senate with the head of the largest meat-packing companies in the world (Greenwald, 2017). The tapes have led to calls for a new impeachment process after he refused to resign, markets crashed and Brazil again seems on the verge of a political cataclysm. The government’s fate is unclear, but this working paper certainly demonstrates that rapidly developing computational propaganda will play a growing role in the upcoming national elections in 2018, potential impeachment and the deeper political processes that have yet to be revealed.

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