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Kremlin Tweets: the politics of social media and the quest for legitimacy in Putin's Russia

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Abstract

On the basis of empirical evidence the paper explores to what extent political activities on Twitter reflect current developments in the political process in Russia. It determines and evaluates strategies of information dissemination of both, the government and the pro-Kremlin organizations, as well as the opposition forces. The paper focuses on Twitter due to its inherent public nature as well as its abilities to disseminate information, making it most suitable for public political activities among other social media platforms. The project focuses on the analysis of reactions and patterns of activity of Twitters users following politically important and widely discussed events in both, traditional and social media. It explores such characteristics of Russian digital community, proposed in previous studies, as high level of homophily and the dominance of intra-group conversations as well the influence of traditional political and opinion leaders on the agenda setting and content dissemination. The obtained results evidence in favor of both hypotheses, which rather uniquely places the Russian case in the context of current social media research.

1 Introduction

Cyber activities of Russia have become one of the key issues of the contemporary global political agenda. The current public discourse is dominated by multiple allegations of Kremlin's interference in domestic politics of foreign countries and, thus, complements the growing corpora of scholarly texts investigating multifaceted impacts of digital technologies on the political process in Russia. The studies indicate the importance of the Internet in general and social media in particular in redefining the sphere of domestic public policy in the country. Regardless of the type of political regime, Russia like other countries has not been immune to bursts of cyber activism. In some cases, and predominantly in democratic countries, these bursts substantially transformed the political agenda and evidenced the growth of new forms of virtual civil ties. In other cases, civic digital activities were instrumental in critical regime transformations. These events prompted the rise of normative approaches, which emphasized the transformative power of information and communication technologies (hereafter ICTs)(Oates, Owen, Gibson, et al., 2006). Studies of Russia have focused on the sustainability of the current regime in the face of a new *digital reality* and attempted to explore its strategies towards domestic and global cyber space.

The attention of academics to the topic of social media in Russia was mainly driven by the 2011/12 mass protest actions, which followed the December 4, 2011 State Duma elections. These elections were largely perceived as fraudulent and social media were considered instrumental in disseminating information and thus orchestrating protest actions. This fact, as well as the existing evidence of the role of social media during the Arab Spring (Lotan et al., 2011; Wolfsfeld, Segev, & Sheafer, 2013) predetermined the focus of the conducted research on the capacity of social media to influence political change in authoritarian states (White & McAllister, 2014; Reuter & Szakonyi, 2015). These studies support the general normative view of social media as the facilitating factor in the democratization process. Indeed, in the absence of a free and fair traditional media (Gehlbach, 2010), social network platforms serve as the major source of alternative content and thus are an important tool for information dissemination.

Social media are also very important in the context of the public political process in Russia. Not only does the non-systemic opposition utilize them as the only de-facto available channel of political communication, but so does the Kremlin itself as well as pro-government forces, who adjust their communicative strategies in order to embrace their supporters not covered by the traditional media. The development of digital technologies and the Internet in Russia are determined by three factors: (a) previous patterns of uncontrolled and predominantly unregulated environment ('path dependency'); (b) their role in shaping the administrative processes; and (c) the overall importance of *cyber technologies* for ensuring the country's competitiveness on the global arena. Understanding the inevitability of ICTs in the modern era and keeping constant the latter two factors, the current Russian ruling elite transforms the cultural patters of Internet use, thus redefining its societal role.

Up until the late 2000s the Russian segment of the World Wide Web remained a largely deregulated and uncontested space, a sort of *lassez-fair* environment, which created a unique culture of interpersonal and inter-group interactions, based on widespread copyright violations and uncensored forms of communication (Mertens, 2006; Potapova & Gordeev, 2015). For the first two presidential terms of Vladimir Putin's presidency, the digital segment had been on the margins of the political agenda, as the state was rather reluctant to introduce and enforce regulations. Further expansion of digital technologies made social media an inherent component of public administration reform initiatives. It was reinforced by the global and domestic growth of the digital segment of the economy (Sedykh, 2017). Therefore, *cyber space* was understood as an important and unavoidable factor of future development, which created new challenges for the contemporary principles of government and requires certain actions in order to ensure efficient regime transition. The crucial role of ICTs in further modernization of the country was recognized in many key documents and also led to the emergence of a certain government strategy towards cyber space within the frameworks of the conception of information policy.¹

In this context, it may be argued that the initial approach of the government towards the Internet and, particularly, social media, was that of co-optation. Going online was initially regarded "a win-win strategy" (Nocetti, 2011), as digital media were regarded as an addendum to the traditional sources of government information. This approach was rather implicitly discussed in the early studies on the subject matter, which predominantly focused on the growing significance of web-blogging and the growing political and cultural impact of the Russian 'blogosphere' (Gorny, 2006), whereas its political significance was considered as rather ambiguous (Gorny, 2009). Most scholars agreed that prior to the 2011/12 protests, Russian social media were evolving independently from the state, serving as an alternative to the government control of the traditional media sphere (Etling et al., 2010; Etling, Roberts, & Faris, 2014) and the efficiency of the government on the web was rather limited (Alexanyan et al., 2012).

The situation has started to change rather radically since the beginning of Putin's third presidential term. The existence of a certain Kremlin strategy towards the internet becomes more and more obvious through growing factual evidence. Whereas, the 2011/12 protest actions in Russia were deemed rather unexpected (Enikolopov, Makarin, & Petrova, 2016) and the reaction of the ruling elite was dictated by the newly emerged circumstances, the events that followed reveal a more deliberate and strategic response by the

¹The general overview of the role of Information and Communication Technologies in the modernization of the country was outlined in the state program "Information society 2010-2020" (Order of the Government of the Russian Federation No.1815-r, from 20 October, 2010). Some specificities, particularly the guidelines to the utilization of social media by public agencies and officials were described in various federal bylaws, such as the "Guidelines on the Implementation of the Principles of Openness by the Federal Executive Authorities", adopted by the Governmental Commission on Coordination of Open Government (Protocol No.AM-P36-89pr from 26 December, 2013).

Kremlin, which included elements of both, *co-optation* and *coercion*. The new measures were aimed at enhancing government control over cyber space and ensuring the domination of pro-government content, since the option of total subjugation and strict censorship was neither feasible, nor favourable. The coercive mechanisms have been rather explicitly discussed in the academic literature (Tselikov, 2014; Baarda, 2017; Gainous, Wagner, & Ziegler, 2017). They were predominantly focused on the tightening of legislation related to cyber activities in Russia. The most remarkable changes, among others, included granting state authorities the extrajudicial right to ban access to literally any internet resource if the information it contained is deemed extremist. Additionally, responding to the impact of influential bloggers during the protest, the legislators adopted a law, which *de-jure* equated them with mass media and imposed registration formalities, which substantially reduced their personal privacy.³ Furthermore, a set of laws were adopted that substantially limited the ways ICTs-sector companies process personal information of Russian citizens as well as the capacity of citizens to exercise privacy in the internet.⁴ In addition to purely restrictive and potentially punitive legislative measures state authorities extended their oversight through soft force mechanisms of controlling the ownership of domestically based ICTs and social media companies (Vendil Pallin, 2017).

Regardless of their potential to significantly transform Russian *cyber space*, these innovations have not yet led to the formation of a new and radically different *modus vivendi* on the internet. Apart from a few prosecutions of predominantly non-political bloggers, public activities on the internet have not been altered. Most prominent opposition political sources as well as notable social media personalities from both the opposition and the pro-government camps continued their on-line activities as usual. Therefore, it may be assumed that these restrictive measures were introduced in order to increase the potential capacity of the state to respond to emerging challenges, which could be used in times of crises (Deibert & Rohozinski, 2010, p.25). Instead, the ruling elite in Russia has opted for a more flexible strategy of exercising control over the Russian internet, which is presumably based on technologies of content domination and covert communication disruption in order to ensure the prevalence of pro-government sentiment and general manageability of the Russian *cuber space*. Deibert and Rohozinsky (2010, p.27) argued that Russia utilized in full the functionality of the so-called 'third-generation controls' over digital space, which 'take a highly sophisticated, multidimensional approach to enhancing state control over national cyberspace and building capabilities for competing in information space with potential adversaries and competitors." As the authors emphasize third-generation controls accentuate surveillance and data mining techniques that are extended to legalize unwarranted monitoring of users and web-resources by designated law enforcement and controlling authorities. The recent legal ban on the so-called 'anonymizers" as well as virtual private networks (VPN) best supports this argument.⁵

The punitive aspects of third-generation controls appear to be at the core of the analysis, however Deibert and Rohozinski mention other techniques, such as state-sponsored information campaigns, which are aimed at influencing "cognitive change rather than [denying] access" (Deibert & Rohozinski, 2010, p.28). They argue that these techniques are difficult for empirical analysis due to lack of reliable data. However, it seems that these very techniques appear to be most frequently used on a day-to-day basis. There exist multiple records of active use of 'trolls' (Sindelar, 2014; Jaitner & Mattsson, 2015; Aro, 2016) and 'bots' (Sanovich, Stukal, Penfold-Brown, & Tucker, 2015; Lawrence, 2015) during the Kremlin sponsored information campaigns. Yet, there is little academic estimates of similar activities by the opposition camp, despite available evidence in the media (Litvinenko, 2012; Keen, 2011). Another aspect of social media use,

 $^{^{3}}$ Federal Law No.97-FZ from 3 May 2014 "On the amendments to the Federal Law "On the information, information technologies, and on the information protection""

⁴Federal Law No.242-FZ from 21 July 2014 "On the amendments to the legislative acts of the Russian Federation, specifying the procedures of processing of personal data in the information and telecommunication networks"; Federal Law No.374-FZ from 6 July, 2016 "On the amendments to the legislative acts of the Russian Federation, establishing additional measures to counter terrorism and ensure public safety"

⁵Federal Law No.276-FZ from 29 July 2017 "On the amendments to the Federal Law "On the information, information technologies, and on the information protection" to come into full force in 1 November, 2017

namely the focus on opinion leaders, is rather abandoned from analysis. Apart from a few investigations of the content and patterns of blogging among the top bloggers in the Russian segment of LiveJournal (Koltsova & Koltcov, 2013), the aspect remains on the margins of the research agenda.

The provided discussion supports an argument that Russian *cyber space* is a dynamic environment that exerts substantial influence on public life and politics. It is being actively and strategically used by all major political actors, which pursue rather different objectives. For the opposition, the Internet remains the only means to reach supporters, disseminate information, and coordinate activities. This medium appears to be quite efficient, as the most notable protests, including those in 2011-12 as well as in March and June of 2017, attracted numerous participants and were organized predominantly through social media. For state authorities and their affiliated supporters, the digital space is a contested one, as they have to disperse and defend a pro-government narrative. While they do not opt for robust methods of access denial and/or restrictive content filtering, they instead prefer to utilize the advantages of digital media and digital social networks for their own benefit. Therefore, this research paper is aimed at outlining and evaluating deliberate approaches and strategies of social media use by political actors in Russia.

2 Concepts and Hypotheses

This research essay explores the most popular perceptions concerning the role of ICTs and digital social networks in the Russian political process. Its main intention is to contribute to a better understanding of the overall importance and specific roles digital media and social network platforms play in the context of public political life in the country. The research focuses on Twitter due to its inherent public nature. Unlike other platforms, and especially social network sites (Facebook, VK.COM (former Vkontakte), and Odnoklassniki), Twitter as a micro blogging platform is used by users with the intention to share their opinions publicly. This fact prompted the majority of public personalities to join the platform and use it as one of their tools for opinion expression, thus extending their public profiles.

Launched in 2006, Twitter gained popularity among ordinary people as a convenient alternative to the traditional blogging platforms for short opinion expressions. This format appeared to be quite appealing for users, determining the tenfold growth of global Twitter usage between 2010 and 2017 (from 30 million to over 300 million active users). It gained popularity in Russia with approximately 9 million active users (in 2016), making the country the ninth largest geographical segment of the global Twitter population. However, internally, Twitter penetration remains moderate with only 7.4 percent of adults (16 years and older) having Twitter accounts, which places Russia in the second dozen of countries in terms of per capita Twitter use, well behind such leaders, as the United Kingdom (39 percent), the United States (35 percent), and the Netherlands (32 percent).

Twitter is a highly dynamic social network platform that changes over time (Kwak, Chun, & Moon, 2011; Myers & Leskovec, 2014), which provides valuable insights on how social media influence public life. The Russian Twitter segment is no different. As was stated elsewhere (Zherebtsov & Goussev, 2017), observations, made in 2016, outlined its high nominal politicization, as most popular accounts (in terms of following) belonged to top political officials - Prime Minister Dmitry Medvedev (first most followed) and President Vladimir Putin (seventh most followed). Furthermore, 32 politically oriented Twitter accounts appeared among the top 100 most popular accounts in the Russian segment. Over the past year, the situation changed, albeit not radically. As of 1 August, 2017 a total of 31 most popular accounts in the Russian segment belonged to politically related personalities and organizations. Dmitry Medvedev's account failed to gain more followers and was surpassed by two non-political public personalities. Vladimir Putin's account gained approximately three hundred thousand more followers, yet remained at the same seventh place. There were fewer politically oriented accounts in 2017 (15 - personalities and organizations and 16 media outlets) than in 2016 (17 each). Such nominal observations show that the Russian Twitter segment has moved towards common global trends, which are determined by the domination of non-political accounts and, presumably, non-political content. Nevertheless, it remains a representative platform for mining people's opinions regarding domestic and international political events as well as analyzing the sentiment of on-line discussions and detecting patterns of information dissemination. Given its inherent public nature and the remaining substantial freedom of expression, it provides deep insights into Russian non-transparent public political domain, as it attracts the most politically active users willing to share their opinions altogether with political actors and public figures, who utilize the platform to extend their audience.

Therefore, this study focuses on the politicization aspect of Russian Twitter, which is widely discussed in the academic literature. Early studies of the Russian segment indicated that it was "becoming an increasingly important platform for the spread of ideas and for online organizing among the major political forces in Russia" (Kelly et al., 2012, p.14), and that politically related activities represent a rather numerous cluster among other forms of Twitter use. The importance of social media in general and Twitter in particular in the context of democracy promotion is a widely publicized issue (Eltantawy & Wiest, 2011; Tufekci & Wilson, 2012; Onuch, 2015). Therefore, the Russian segment was also discussed predominantly in the same context with findings supporting the major hypothesis. It was argued that foreign-owned social media (Facebook and Twitter) have a greater impact on the patterns of circulation of anti-government and pro-protest information than domestically owned platforms (VK.COM, Odnoklassniki), due to the greater state control over the latter ones (Reuter & Szakonyi, 2015, p.49). Thus, the government appears to be a competitor to the opposition with respect to the utilization of social media. Additionally, public opinion leaders play an important role "in the production and re-distribution of communication via Twitter" (Greene, 2012, p.13). To a great extent these findings determine the research problems, which are being explored in this essay.

The complexity of the phenomenon being studied prompts the investigation of its main components. Following the influential academic debates on the transformative potential of social media and the subsequent appraisals of their under-performance in Russia in this regard, this essay explores the salience of politically relevant topics and their share in the overall discussions. Therefore, it questions the significance of the 'nominal politicization' of Russian Twitter, by studying the phenomenon of high popularity of politically relevant accounts.

Given the appealing nature of Twitter for public expression of opinions for both ordinary users as well as public figures, the issue of patterns of information dissemination becomes quite significant. The impact of this platform on setting (or influencing) the current public agenda is, to a great extent, dependent on the internal structure of established virtual communities as well as the popularity of 'message deliverers' (i.e. user accounts participating in the creation and broadcasting information). This aspect determines the focus of this paper on the network structure of established virtual communities.

Finally, the research analyzes specific strategies of content domination, used by both the state and the opposition. In a broader context it is aimed at establishing similarities and differences of methods utilized by key political forces in Russia, as well as providing insights into their efficiency. Particular attention is paid to the role of traditional (or 'offline') public opinion leaders and their ability to attract the attention of masses in the virtual sphere. In addition to this, the research questions the importance of such widely discussed tactic of automated information dissemination by means of botnets, utilized predominantly by the Kremlin. Moreover the research expects to discuss the specificities of reactions of various Twitter communities to key political events in order to discover their underlying socio-demographic parameters and their correspondence with the established 'real' political groups in Russia.

The logic of analysis, pursued in this research, is ordered by certain conceptual assumptions regarding the sociological and behavioural characteristics of social networks as well as the fundamentals of Russian political process. Describing the public political space in Russia, scholars tend to focus on two major political forces - the pro-government supporters and the so-called 'non-systemic opposition' - as long as the

hierarchically organized and vertically integrated political system, established in the country during Vladimir Putin's presidency, *de facto* withered away the significance of traditional institutions of public policy (Gel'man, 2015). This trend was further reinforced by the post-election protest movement of 2011-12, when *Bolotnaya* and the following protests united efforts of various political groups with conflicting ideologies. Following this approach, the analysis of political discussions on Twitter is particularly focused on mapping relevant virtual political communities and comparing them with real ones. It is expected that the Russian virtual political space is accordingly divided into two conflicting communities. Although the 'watershed' between the two is expected to be sharp, their internal structures will be amorphous and unstable due to the ideological diversity in the context of the opposition and the lack of mobilization incentives in the case of pro-government supporters.

Following the logic of social network structure, it is expected that users will more likely engage into active discussions with like-minded users and share content of those public personalities, whose cultural and ideological positions will meet their own. Issues of ideological stratification of digital social network has created vigorous scholarly debates. Some scholars believe that regardless of ideological divides that exist in society, the very nature of digital networks increases inadvertent exposure to ideologically diverse information, particularly due to "less than perfect online selective exposure strategies" (Brundidge, 2010, p.687). Others believe that the tendency of users to self segregate will limit their own capacity to be exposed to ideologically cross-cutting content, commonly regarded as the 'echo chamber' effect (Adamic & Glance, 2005; Colleoni, Rozza, & Arvidsson, 2014; Barberá, Jost, Nagler, Tucker, & Bonneau, 2015). Referring to the phenomenon of homophily, these scholars believe that not only "public exchanges... take place predominantly among users with similar viewpoints" (Barberá, 2014, p.88), but also this pattern of information dissemination "could lead to a further increase in political polarization" (Halberstam & Knight, 2016, p.87).

Russian Twitter represents an interesting case-study in this regard mainly do to its relatively high nominal politicization. On the one hand, following empirical evidence of the significant impact of 'echo chambers', it is expected that virtual political communities will be highly segregated, with quite limited intra-group interactions. On the other hand, following Greene's observation (Greene, 2012) on the importance of opinion leaders and their relatively high popularity, the issue of inadvertent exposure to ideologically diverse content remains topical and can influence the analysis of information diffusion patterns. Moreover, the phenomenon of homophily, despite being well discussed in the cases of other countries, remains rather untouched in regard to the Russian Twitter segment.

Furthermore, high politicization of social media, coupled with the under-representation of the opposition in traditional media, brings to the forefront the discussion of information strategies, utilized by the major political groups in Russia. Specifically, the research explores the equalization theory (Tyler, 2002; Xenos, Vromen, & Loader, 2014; Gibson & McAllister, 2015), which implies that such characteristics of social media, as the ability to reach wide audiences, combined with relatively low expenses involved in the content production, create great opportunities for those who are deprived of access to traditional media yet can still reach noticeable publicity levels. The equalization theory contains the potential to explain the rapid growth of the Internet and relatively stable popularity of political blogging, as well as potentially provide useful insight in regards to the mobilization potential of social media in Russia.

The essay also explores a valuable proposition regarding information dissemination through social networks, which, in principle, disregards the efficiency of the hierarchical principle of public opinion formation, commonly utilized in traditional media (Watts & Dodds, 2007). As stated elsewhere, in social networks "information spreads via many small cascades, mostly triggered by ordinary individuals" (Bakshy, Hofman, Mason, & Watts, 2011, p.9), making them as valuable in this regard, as traditional public opinion leaders. Trivial and anecdotal examples of such an unusual pattern of information dissemination was further enforced by statistically proven evidence *(Ibid.)*,(Myers & Leskovec, 2014). It is expected, that in the Russian case, anti-government content should appear more influential given the higher diversity of the opposition community.

3 Data and Methodology

The research is based on data collected from the Russian segment of Twitter. The diversity of objectives required using both the Public STREAM and REST Application Program Interfaces (APIs). Commenced in early-2016 this project focused on selecting samples of Russian Twitter discussions concerning most resonant public and political events. This essay is based on samples of 22 events. The Twitter REST API was used to query for samples of events on the basis of their coverage by traditional media (in newspapers including their web-sites and social network sites) and digital media (such as Yandex news). In most instances the selection process was organized in such a way that the entire event is covered, including preliminary and *post-factum* messages and retweets.

Additionally, the streaming API was used to sample general public discussions. It allows streaming and downloading approximately one percent of total discussion. A filter on Russian language was used to narrow down the area to Russian segment; therefore, as a result, a random sample of total Russian Twitter between 19 March 2017 and 15 July 2017 was collected. The GET friends feature of the REST API was also used to obtain the friendship connections between all tweeting users captured in the 22 events and the Russian language streaming dataset in three amalgamated groups to minimize the API rate limits.

3.1 Politicization

The posited research questions and the outlined conceptual assumptions determine the logic and structure of this essay. First of all, the research explores the politicization hypothesis by identifying the percentage of politically relevant discussions within the total sample of the default Russian Twitter stream. Keywords (including hashtags) are identified in the data on the basis of daily thresholds. The underlying assumption for doing this is that discussions normally change on a daily basis. Such an approach facilitates in determining the absolute share of politically relevant topics and their impact on the daily Twitter discussions. The analysis will also identify specific 'bursts' or 'spikes' of blogging activity. We consider spikes to be periods of Twitter activity (in terms of both, original tweets and retweets) that are above at least one standard deviation from the average daily activity. This approach adapts the method proposed in (Myers & Leskovec, 2014).⁶ To further advance the picture, spikes of Twitter activity are compared with the list of most relevant political discussions identified on the basis of content analysis of traditional printed and digital media. This method permits the identification and evaluation of pattens of consistency of discussion topics that occur on Twitter, and the informational agenda imposed on society via traditional media.

3.2 Homophily

Second, the research tests the validity of the homophily hypothesis and the 'echo chamber' effect in regards to political discussions in Russian Twitter. Expecting users to listen, share, and have discussions predominantly with like-minded individuals, follow relationships are often posited as the main building block of community structure on Twitter (Halberstam & Knight, 2016; Myers & Leskovec, 2014). Utilizing friendship based communities, this research evaluates its application to Russian Twitter by testing the segregation of detected communities. Considering the directional nature of Twitter friendships, the Infomap algorithm is used to detect communities (Rosvall, Axelsson, & Bergstrom, 2009) and the ForceAtlas2 force directed layout is used to visually represent the resultant networks (Bastian, Heymann, Jacomy, et al., 2009; Jacomy, Venturini, Heymann, & Bastian, 2014).

Focusing on intra- and cross-community conversations, segregation and specifically the 'echo chamber' hypothesis is evaluated by looking at how information is disseminated by retweets and mentions and how

⁶The authors originally proposed to consider bursts above two standard deviations away from the average. Yet our results indicate that given significantly lower intensity of conversations in the Russian segment make one standard deviation threshold more informative.

homophilous these conversations are. If communities are highly homophilous, users will tend to retweet content of and mention mostly like-minded individuals in their own community. This is assessed both nominally, by comparing the proportions of both types of conversation shared within and between communities, as well as by standardizing a homophily measurement developed by Currarini et al (2009).

Consider s_i as the number of conversations occurring between users of community *i*, and d_i as the number of conversations with users of communities other than *i*. Nominal homophily can thus be defined as a the proportion of conversations occurring within the users' community (1).

(1)
$$H_i = \frac{s_i}{s_i + d_i}$$
; (2) $w_i = \frac{N_i}{N}$.

This proportion however, will be influenced by the size of the community a user is in, as users in smaller communities are more likely to converse across community lines simply because their community is small. The size of a community can be taken into account as w_i (2), with N_i denoting the number of users in community *i*, and *N* representing the total number of users in the network.

(3)
$$H_i = w_i$$
; (4) $H_i > w_i$; (5) $H_i < w_i$.

Three types of homophily can be defined using (1) and (2). Baseline homophily (3) occurs when the proportion of user conversations within community i equal the relative size of the community, indicating that on aggregate, users in that community show no special preference or bias for their own friends. Alternatively, if users are biased and converse more often within their own group than the relative demographic size of their community, than community i satisfies inbreeding homophily (4). Finally, if the community shows heterophilous patterns (5), then the number of conversations within the group will be less than the relative size of the group (Currarini, Jackson, & Pin, 2009). To enable comparisons between communities of varying sizes and different types of conversations that occur on Twitter, homophily is standardized by bringing w_i to the other side of the relation, creating indicators for baseline homophily (6), inbreeding homophily (7), and heterophily (8).

(6)
$$\frac{H_i}{w_i} = 1$$
; (7) $\frac{H_i}{w_i} > 1$; (8) $\frac{H_i}{w_i} < 1$.

Besides determining communication patterns, graphical mapping of Twitter is proven to be a cost-efficient method of identifying potential artificial activities in social networks by means of demonstrating 'botnets' and exploring their overall impact on conversations (Wang & Paschalidis, 2015; Zherebtsov & Goussev, 2017). As bots are seemingly an important factor of Kremlin's information policy, the analysis of their influence is understood in terms of the capacity of messages, conveyed through botnets, to circulate within real communities.

3.3 Leaders

Finally, the research explores the impact of public opinion leaders on online political discussions. The analysis is based on a sample of 470 accounts, which comprises public personalities and organizations as well as traditional media. These users were selected if they: (1) actively post on politically relevant events; (2) have at least ten thousand followers; and (3) either occupy positions in the government / non-government organization, or are well-known media personalities. The sampling technique adapted the 'snowballing' approach but required several stages in order to improve the validity of the outcome. First, a top tier of politically relevant users was manually selected from the the list of top 100 most popular accounts in the Russian segment. Secondly, from all samples collected, the 1,000 most followed accounts were selected and manually sorted in order to identify politically relevant ones. These two steps together resulted in a list of 240 accounts. Among these accounts, only those that followed no more than 500 others, were selected. Subsequently, the friends of each was obtained, but only those who themselves had at least 10,000 followers were selected. Qualitative filtering of this list resulted in the creation of a master sample of active Twitter public personalities.

In case of this research project, the selection bias, inherent with this type of sampling technique results in the establishment of a representative collection of user accounts. Given the 'echo chamber' effect, it is assumed that those who use Twitter as an interactive platform and not only spread, but also receive information, will strategically connect (or themselves follow) with a limited amount of personalities, many of which will be public figures themselves and most likely involved in the same sort of public activities (politics in the case of this study). It is assumed that the rather specific community of 'political celebrities' is limited in size and will include only publicly recognizable personalities, who will either be quite popular in the digital format, or well-known through traditional media appearances. Although, the 10,000 followers threshold is rather arbitrary, it allows to select only those accounts that have the potential to efficiently create and/or disseminate political information. Choosing the 500 friend threshold excludes those personalities who apply a tactic of following any accounts that interact with them, which doesn't improve the selection.⁷ Thus, it is unlikely that any significant opinion leader was excluded from the sample.

Next, where applicable, the last 3,200 tweets of the leaders from our sample were downloaded using the REST API for analysis and ranked in terms of their impact on political discussions. Finally, in order to take network structure and the relative importance into account, as well as abstract from nominal indicator of the number of friends, which can be boosted using bots, PageRank is used to determine centrality for each leader based on follow relationships (Page, Brin, Motwani, & Winograd, 1999).

4 Discussion

4.1 Importance of Russian Twitter

First of all, the paper explores the assumption of general politicization of social media and particularly Twitter in Russia. On the one hand, a highly politicized social media platform can be expected to react to most political events and be biased in heavily discussing political events when they occur. On the other, a non-politicized social media platform can be expected to discuss mostly non-political topics and demonstrate only marginal interest in high profile political events. Russian Twitter is found to be a partially politicized social media platform as its users do not widely discuss political topics and react only marginally to highly political events occurring in Russia.

In the streaming sample, representing a random section of on-line discussions in the Russian Twitter segment visualized in Figure 1, only one political event—the March 26 protests—appeared in a spike deviating more than one standard deviation from the average daily number of conversations. No other politically relevant event, including the widely publicized (by opposition media sources) mass-protest action of June 12, resulted in a significant divergence from the daily average rate. Only on three occasions did discussions exceeded two standard deviations, all of which were determined by non-political causes.⁸

Deeper investigation of Twitter coverage of both the March 26 and June 12 protests reveals that regardless of the magnitude and significance of these events for the domestic political process (i.e. these were first significant public manifestations in Russia since May 2012 protests) their contribution to the discussed agenda was rather marginal. The downloaded corpus of Twitter messages for the days of protests was pre-processed and standardized in order to reveal all crucial keywords, which allows the extraction of a significant majority of protest-related tweets. Subsequently, discussions in the samples were divided in two topics and the proportion of protest-related messages was identified and allocated. As figures 2a and 2b

⁷For instance, the #followback hashtag is commonly used by users to increase their number of followers.

⁸For example, the most vigorous discussion in Twitter that took place on 21 May 2017, was inspired by the international music event—the Billboard Music Award. The event appeared to be quite resonant among Russian twitter users and comprised at least 75% percent of total conversations that day. It had such an impact, that it pulled the statistics well beyond three standard deviations. Other instances included the celebration of the Victory Day in Russia - 9 May (31% and 2 standard deviations above average daily discussions) - and 11 May, which was related to the Eurovision song contest in Ukraine, which Russia missed due to political causes.





The trend of sum of Number of Records for Twt Createdat Day. The data is filtered on Twt Createdat, which ranges from 19/03/2017 12:00:00 AM to 05/08/2017 11:59:59 PM.

demonstrate, in both instances protest-related tweets were heavily outnumbered by other topics. However, in the case of the March 26 sample, protest related tweets pushed the daily total quantity of discussions above one standard deviation. Similarly, protest related content failed to significantly influence discussions on June 12, regardless of the larger magnitude of the event, as well as more tense confrontation between the protesters and law enforcers that resulted in a significantly larger number of detentions and administrative arrests in comparison to the previous protest action. Interestingly, hashtag use during these two protest days was very heavy, particularly by the opposition ⁹. This indicates that despite the low overall importance of the protest topic, hashtags serve a vital role for the opposition to mobilize and coordinate the dissemination of content.

These results question the assumption concerning the overall politicization of the Russian segment of Twitter. General discussions tend to be focused around non-political events and it seems that the overall capacity of politically motivated topics to influence general trends is quite limited, regardless of the their significance and the level of confrontation they create. These finding contribute to the deliberations of the thematic characteristics of Russian Twitter discussions, started in (Kelly et al., 2012). Using a different methodology (based on measuring retweeting patterns) and on the basis of an earlier sample authors revealed that the so called "public segment" of Twitter discussions is among the top-3 most largest thematic segments. However, if the discussions are measured on a daily basis, the overall impact of politically salient events to transform coverage is less than 10 percent.

The salience of protests, regardless of their insignificant Twitter coverage brings to the forefront two potential explanations. First of all, it questions the importance of Twitter as a platform in the context of political discussions. Its relatively less widespread infiltration in comparison to such social network

 $^{^{9}}$ Most popular hashtags used include #DimonAnswer and #DemandAnswers, both referring to corruption allegations of Prime Minister Medvedev and cause of the protests.





platforms than in other countries, could diminish its impact on information distribution and mobilization of protesters, which was a significant factor in some other cases (Tremayne, 2014). Secondly, it could be assumed that politically significant Twitter conversations do not go beyond the communities where they originate and, therefore, are resonant only to the politically active users. This assumption requires further analysis of Twitter networks as well as the identification of key influencers in politically relevant communities.

4.2 Exploring homophily

Considering the widely observed presence of 'echo chambers' in social media platforms internationally, it is expected that the Russian segment of Twitter will be highly segregated into isolated ideological communities. Building on previous smaller-scale findings (Zherebtsov & Goussev, 2017) and sociological forces shaping political space in the country, it is further expected that the virtual political space on Twitter will be separated into two specific camps: of official government authorities and their pro-government supporters, on the one hand, and the 'non-systemic' opposition, on the other. Finally, inasmuch as the polarization between the two real political camps is considerable, the two communities are not expected to be highly heterophilous.

This is evaluated using a multi-sample network of Russian users participating in all political discussions on Twitter between December 2016 and June 2017. The amalgamated master political network, with users represented as nodes and friendships as the edges between them (Figure 3), demonstrates that Russian political Twitter is highly segregated into copious communities. In line with expectations, two distinct and highly active political communities are observed — a pro-government one (community 0 or purple), and a non-systemic opposition one (community 1 or teal). The pro-government community includes accounts of government-owned media, pro-government politicians and pundits, as well as official government authorities. The non-systemic opposition community includes accounts of prominent well-known opposition leaders and bloggers, media outlets as well as parody accounts. The latter ones are a rather unique phenomenon, not observed among the pro-government cluster, which represents political satire, completely withered from the traditional political discourse.

Situated exactly between the two contrasting and polarized communities representing the ideological camps of Russian politics, a third political community was also detected (Community 3 or light green). Similar to the importance of these personalities/organizations in the political process, their Twitter accounts also exert significant influence throughout the social network by setting the agenda and shaping the narratives. These users demonstrate the ability to disseminate information to their respective audiences and mobilize supporters. Interestingly, this group comprises not only pro-government leaders (most notably Prime Minister Dmitry Medvedev, the official account of Vladimir Putin (@KremlinRussia)), but also the opposition (particularly Alexei Navany), as well as most accounts of major federal media outlets (Channel 1, *RIA Novosti, Echo Moskvy*).



Figure 3: Russian Network of users participating in numerous political discussions

Modularity: 0.510569

Analysis of the network topology also revealed numerous sets of non-political, unrelated, or presumably bot communities. The most sizeable non-political community of note is community 2 (dark grey), making up 6.3% of the whole network. Made up predominantly of accounts of young, school age Russians, its users mostly shared content on early life experiences, school topics, and popular culture, only rarely venturing into mentioning political topics or engaging in political discussions. Indeed political topics that intersected with large scale cultural events, such as the Euromaidan, usually resulted in samples that heavily featured this community.

Other communities were categorized as Russian, either due to Twitter's language detection algorithm, which seems to categorize the language based on the use of the Cyrillic alphabet (for instance Community 5 or dark green that includes many Mongolian users), or due to other nationals who also communicate in Russian. Furthermore, several communities heavily made up of bots were also observed. Content analysis of these bot communities, the content they shared during political events, as well as their public timelines, showed that while the sophistication of the bots varied between community, the patterns of information dissemination seemed to be consistent for each group.¹⁰ Indicating the likely presence of 'botnets', or a coordinated network of bots programmed to act together (Murthy et al., 2016), and their oft participation in political discussions, strongly supports the argument of the presence and use of 'bots' as a political strategy in Russia. The strong segregation of the network and clear separation of these communities from the real political groups and discussions enabled the research to excluded them from subsequent analysis.

Investigation of the level of segregation in the master network also reveals moderate levels of modularity, or 0.5105. The popular statistic measures the strength of division of a network into modules, with a negative result demonstrating the lack of community structure and the maximum indicator of 1 representing perfect segregation into communities (Brandes et al., 2007; Newman, 2006). To further validate the level of segregation and remove the potential influence of the numerous non-political communities on increasing the modularity statistic, the three main political communities were isolated into a separate sub-graph. As the modularity of this sub-graph was calculated as 0.48226, this demonstrated the consistency of the network segregation. However, while the observed modularity level demonstrates medial segregation of the network based on who users choose to follow, it does not prove an 'echo chamber' exists. To do this, the homophily of each community was evaluated, demonstrating the clear preference of users in each community to converse with and share information from like-minded users in their own group.

Such homophily is visible on a nominal basis. Users in each community predominantly retweet (table 1) and mention (table 2) users in their own community. Furthermore, as expected, while communities 0 (pro-governemtn) and 1 (non-systemic opposition) demonstrate some willingness to mention and retweet the other, they are more likely to converse and share information from community 3 (the group of central influencers). Comparing standardized homophily indicators $(\frac{H_i}{w_i})$, each community demonstrates strong inbreeding homophily (table 3). Interestingly, the non-systemic opposition is more homophilous than the pro-government community. The identified 'botnets' (such as community 6) also show excessively high standardized homophily indicators.

While nominal and standardized statistics demonstrate the strong applicability of the 'echo chamber' theory to Russian Twitter, the research also finds that there is marginal preference for cross-community communication the closer a user is to the edge of his/her community and closer to the opposing group. This is visually identifiable in figures 4 and 5. For each event, figure (a) represents the normal community colouring based on who the users follows, with figure (b) representing users as their original colours if they retweet information only from their own community and coloured yellow if they retweet at least once content from another community. Visually, this places the users who demonstrate a willingness to share cross-community and farthest from all others demonstrate the those users who are the most orthodox in their representative beliefs and never engage or converse on opinions discordant with theirs.

¹⁰For instance a set of similar advertisements for mattresses spread through the bot community with the same day.

Communities	Com 0	Com 1	Com 2	Com 3	Com 4	Com 5	Com 6	•••	All
Com 0	83.5%	3.3%	0.1%	5.8%	0.0%	0.0%	0.0%		100%
Com 1	2.8%	63.2%	0.0%	13.9%	0.0%	0.0%	0.0%		100%
Com 2	1.6%	1.6%	66.0%	8.9%	0.0%	0.0%	0.0%		100%
Com 3	12.8%	15.2%	0.5%	$\mathbf{33.4\%}$	0.0%	0.0%	0.0%		100%
Com 4	10.5%	21.2%	0.4%	37.8%	4.3%	0.0%	0.0%		100%
Com 5	4.3%	1.1%	0.1%	1.6%	0.0%	91.1%	0.1%		100%
Com 6	0.5%	0.0%	0.0%	0.1%	0.0%	0.0%	97.7%		100%

Table 1: Intra and cross community retweets

Table 2: Intra and cross community mentions

Communities	Com 0	Com 1	Com 2	Com 3	Com 4	Com 5	Com 6	•••	All
Com 0	73.0%	6.9%	0.1%	8.2%	0.0%	0.0%	0.0%		100%
Com 1	11.2%	64.6%	0.0%	10.9%	0.0%	0.0%	0.0%		100%
Com 2	0.2%	0.1%	89.5%	0.7%	0.0%	0.0%	0.0%		100%
Com 3	19.3%	8.1%	0.5%	41.6%	0.0%	0.0%	0.0%		100%
Com 4	20.8%	14.3%	0.0%	35.1%	0.0%	0.0%	0.0%		100%
Com 5	0.1%	0.2%	0.0%	0.0%	0.0%	$\mathbf{99.4\%}$	0.0%		100%
Com 6	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	97.1%		100%

Table 3: Relative community sizes and standardized homophily indicators

	Com 0	Com 1	Com 2	Com 3	Com 4	Com 5	Com 6
Relative weight	21.25%	9.69%	6.35%	10.26%	0.38%	0.61%	0.83%
$\frac{H_i}{w_i}$ (retweets)	3.4	6.7	14.1	4.1	0	162.9	117
$rac{ar{H}_i^i}{w_i}$ (mentions)	3.9	6.5	10.4	3.3	11.3	149.3	117.7



(a) Representation of users colours by community (b) Visual representation of retweet homophily

Figure 5: Network of users discussing the second anniversary of Boris Nemtsov's assassination



(a) Representation of users colours by community



(b) Visual representation of retweet homophily



4.3 Assessing the impact of leaders

Given the rather marginal use of Twitter in the Russian population and the narrow aggregate impact of political conversations on the platform, yet at the same time its demonstrated mobilizing potential, it is expected that the platform will be used judicially and strategically by leaders in order to influence the political public. In this context, key influencers play a crucial role in information dissemination and the overall integrity of their relative community and the network as a whole.

Four types of leader accounts can be identified in the Russian Twitter segment. First of all, these are personal accounts of top politicians, media and public personalities. Many of these accounts are verified 'de-jure', while others produce content that corresponds with ideological views of their nominal owners and therefore can be regarded as 'de-facto' genuine. The second cluster comprises accounts of traditional media sources, which utilize the platform predominantly to reach a wider audience. In most instances, tweets, produced by these types of accounts contain links to materials issued on these media's websites, sometimes with opinionated comments that reflect the editors' ideological preferences. These accounts appear to be the most interconnected within as well as outside the ideologically bounded communities they belong to. The third type includes official accounts of government agencies, which were selected for analysis for multiple premises. Twitter has been actively used by private sector companies and entrepreneurs for marketing purposes. Indeed, there is a growing body of research on the subject matter, which explores and analyzes strategies of efficient public relations and marketing for businesses. If used efficiently, Twitter could boost a company's performance. The same logic is applied to political organizations (Waters & Williams, 2011; Towner & Dulio, 2012), which adapt advanced technologies of governance within the Government 2.0 paradigm. This approach was officially adopted in Russia in the context of the Federal Program "Information Society 2011-2020" (Zherebtsov, 2018). Accounts that produce and circulate political satire and politically relevant entertainment content comprise the fourth type of account. While they themselves are not sources of official information or represent certain political groups, such accounts appear at the epicentre of selected discussions and disseminate certain sentiment. Moreover, they are quite popular not only among regular users, but also among other top political influences.

Analysis of content produced by the leaders reveals several remarkable trends. There is a certain consistency between the groups in terms of retweeting and liking of messages. The parody group outperforms all others in the combined popularity of its messages, in terms of both 'likes' and retweets. Needless to say, all those accounts produce and share oppositional sentiment. They are followed by the group of personal accounts. Interestingly, the content produced and shared by these types of accounts is often retweetted (or shared and thus actively endorsed) as it its liked (or passively endorsed). Social media activity of traditional media appears to be much lower than the first two types of accounts. To some extent, this demonstrates quite remarkable characteristic of the Russian Twitter segment, which evidences its rather engaged character by the political community. While entertainment purposes are prevalent even in the context of political discourse (determined by the overwhelming popularity of the parody accounts). users tend to engage in political discussions and favour opinionated statements of political pundits and media personalities over factual information circulation. Quite expectedly, official accounts appeared to be the least publicized in our sample; a trend best explained by the nature of content produced and shared by the accounts of this group. As official accounts tended to share links to digests and press-releases, produced by the press-services of their respective agencies, this information is regarded as the least entertaining (or 'infortaining') to users. The fact that this group did not fall far behind the media group is worth further elaboration.

To test the overall unusual popularity of government accounts, a subsample of the top 10,000 most popular tweets authored by the leaders was created. Similar metrics revealed that the group of official accounts had moved from the last to second place in terms of retweets. A cursory evaluation of this shift based on content analysis of statuses of selected members of this group revealed an unusually high activity of

Table 4: Leaders impact metrics (by	group)	
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Account type	Av. # of retweets	Av. $\#$ of (favourites) 'likes'
Personal (302 accounts)	(2) 26.80	(2) 27.67
Media(86 accounts)	(3) 15.31	(3) 12.10
Official/gov-t (49 accounts)	(4) 12.37	$(4) \ 10.6$
Parody (32 accounts)	(1) 98.35	$(1) \ 150.74$

Table 5: Top 10,000 tweets by the leaders (by group)

Account type	Av. # of re-tweets	Av. $\#$ of (favourites) 'likes'
Personal (302 accounts)	(3) 691.88	(2) 959.91
Media(86 accounts)	(1) 848.53	(3) 855.88
Official/gov-t (49 accounts)	(2) 697.61	(4) 691.25
Parody (32 accounts)	(4) 664.49	$(1) \ 1303.07$

automated twitter accounts (i.e. bots). Therefore this discrepancy between the total parameters of the group and its performance in the case of the sample of most popular tweets implicitly indicates the existence of the selective strategy of boosting certain topics, applied by the Kremlin.

The types of leaders also differ from one another in terms of their capacity to influence discussion. Therefore, further discussion on the leaders' community is focused on the search for better measurements of its impact in the context of politically relevant topics.

The most their critical metrics of individual tweets, namely favorites ('likes') and retweets, was queried from a sample of 3,200 most recent tweets authored by the leaders. These metrics were aggregated and the average number of 'likes' and retweets per leader was calculated. Used independently, it provides a good estimate of the 'average power of a tweet' of the given user, although does not consider the issue of outliers—accounts with relatively short lifespan and yet, quite high performance metrics. To address this, the maturity of accounts was estimated by multiplying the 'tweet power' metric by the average number of tweets per day. Given the fact that all accounts in the leaders sample are real and used actively, the issue of automated content generation did not affect the overall calculations. Assuming that bots are less likely to be followed by leaders, the sample has no evidence of presence of unusually and/or suspiciously active accounts. Therefore, the average leader account generates approximately 16.03 ($y \in +-2.3^9$) tweets per day and the most active account, quite expectedly belonging to the media group, generates on average 170 'tweets' per day.

Furthermore, leaders' accounts were ranked according to the estimate of the average power of their tweet. Figure 6 illustrates the distribution of these accounts alongside the quantile scale on the basis of four designated groups. Obviously, the parody group accounts generate content ordinary users are eager to react to. 48.5% of such accounts in the sample appeared in the first quantile with following quantiles accounting for 15.2%, 21.2%, 12.1%, and 3.03% respectively. Two thirds of media group accounts also show the tendency to generate highly resonant content (30.2% of accounts in the 1st quantile and 33.7% in the second). The dominant portion of accounts from the official group are allocated in the last two quantiles (24.5% and 44.9% respectively), generating the least impactful content. Therefore, the discrepancy between the average power of content, generated by this accounts, and their much better performance in the case of the most popular 'tweets' subsample is quite remarkable and raises the importance of future in-depth content analysis of messages, produced by them. On the one hand, the content could be artificially 'boosted'; on the other, top 'tweets' of these accounts could discuss politically

 $^{^9\}mathrm{At}$ 95% confidence intervals

Figure 6: Frequency distribution of leaders' twitter accounts (% by group by quantile)



crucial issues and be genuinely shared alongside the network, which to some extent, supports the thesis of the bursty nature of Twitter networks (Myers & Leskovec, 2014). Finally, the most populous group of personal accounts appears to be quite evenly distributed alongside the sample, which indicates a rather regular pattern of popularity of account owners.

In the case of the Twitter-based example of digital political communication in Russia, the average tweet power metric is quite indicative of certain patterns of ongoing discussions and the role traditional leaders play in them. However, it does not speak specifically about the influence of those leaders on the content shared by their networks and the political community of Russian Twitter in general. Although gaining quite significant attention of the research community, this issue has not resulted in the establishment of a certain widely accepted method of identification of Twitter influencers. Time-invariant approaches tend to compute influence on the basis of either centrality (network-dominated approach), or content impact (retweet-dominated approach). At the same time a combination of both methods could be quite productive.

Certain conceptual remarks speak in favour of such an approach. The impact is the derivative of two major parameters: the importance of content and its ability to meet the aspirations of ordinary users, and the capacity of this content to surf through the network and be visible to a wide audience. The former is marked by users' reactions to messages in terms of 'liking' (passive endorsement) and retweeting (active endorsement). By 'liking' certain messages a user expresses support, making his own followers informed about the tweet through notification alerts. By retweeting he/she signifies that this message is certainly worth knowing about within his/her own micro-community. Yet, if the message originator represents a highly homophilous community, the capacity of such message to be seen is limited by its network structure. A more central placement of a leader within the community and, possibly, within the entire network, creates better opportunity for good-quality content, authored by this person, to reach a wider audience. The latter parameter signifies the necessity to address centrality in assessing the influence. It should be noted, however, that estimating influence on the basis of just patterns of the number of followers is imperfect. An anecdotal example from the specific case of Russian Twitter is quite illustrative in this regard. The official account of the Russian President Vladimir Putin (@KremlinRussia) is the third most

Table 6: Leaders influence index (group breakdown), %

	I quantile	II quantile	III quantile	IV quantile	V quantile
Personal	15.8	19.6	22.0	20.6	22.0
Media	29.9	23.4	19.5	14.3	13.0
Parody	28.6	32.1	17.9	17.9	3.6
Official	18.5	3.7	7.4	37.0	33.3

popular and third most central in the leaders sample. Yet the content it generates is ten times less endorsed than the most endorsed Parody account (@StalinGulag), which has half the centrality score. Hence, although both concepts are correlated, they represent rather different issues of information dissemination and therefore, should be addressed in measuring influence of certain leaders.

The approach, used in this article, combines both parameters. It creates an index of leaders' influence, which represents the potential to have an impact, rather than *a bona fide* substantiation of influence. The individual index $Linf_i$ (9) is derived from the previously presented parameters where Fav_i is the average number of 'likes' per leader's 'tweet', $TW\bar{T}day_i$ is the average number of retweets per leader's 'tweet', $TW\bar{T}day_i$ is the average number of retweets per leader's 'tweet', $TW\bar{T}day_i$ is the average number of tweets per day, generated by the leader, and Cpr_i represents his/her PageRank centrality. Although this model is quite simplistic, it yields some interesting results.

(9)
$$Linf_i = ((\bar{Fav}_i + \bar{RT}_i) * TW\bar{T}day_i) * Cpr_i$$

First of all, the introduction of the centrality index slightly modified the frequency distribution of accounts. The index pushed the forth account type of the most popular and visible political and public personalities as well as media sources. In the first quantile, comprised of the most influential Twitter users, two thirds of accounts belong to the opposition and only one third—to the pro-government community. A similar situation is observed in the second quantile, where 70% of accounts can be referred to the opposition and only 30% to a pro-government group. The first quantile included such popular opposition leaders, as Alexei Navalny, Leonid Volkov, Oleg Kashin, media outlets - *TVRain, Echo Moskvy, Meduza*, as well as highly influential parody accounts. The pro-government group, although outnumbered by its opponents, is represented by its most outspoken pundits (Vladimir Soloviev and Alexey Pushkov) and notable media sources (*RIA Novosti, Vesti News*). Interestingly, the most followed political accounts of Dmitry Medvedev and Vladimir Putin, although appearing in the top quantile are located in the end and in the middle of it respectively.

Such dominance of opposition accounts in the top half of the influence index speaks for the higher importance of this form of communication for the opposition and also supports evidence of the greater structuration and network sophistication from the network analysis. The opposition not only focuses on social media as its main form of reaching the audience, but also emphasizes the role of opinion leaders, in this regard with Alexey Navalny being the major actor and the greatest influencer not only in his own political community, put also in the entire network. Pro-government pundits, like Vladimir Soloviev and Alexei Pushkov outperform their own formal leaders in terms of influence in the virtual community, and accounts of traditional federal mass media instrumental in the dissemination of the pro-government content. This establishes a new framework of Russian political Twitter, which is quite different from (Kelly et al., 2012) in terms of network structure and from (Greene, 2012) in terms of content.

This new index of leaders influence obviously requires further testing and validation. Given the nature of the research topic, where outcomes are easily predictable on the basis of traditional theories and concepts of Russian politics, the best way to test reliability of a new instrument would be the utilization of another approach. Given the fact that this new method is a derivative of major other influence indicators, reusing them would result in unfavorable procedural overlap and, thus, similarity of outcomes. To overcome this issue, and avoid complex dynamic methods, this research adapts the principle, utilized in Hirsch index (h-index) of academic impact.

This method is rather unexpectedly suitable for measuring leaders' performance in Twitter, although its efficiency could be limited in terms of general network analysis, where the goal is to assess influence of ordinary users. With respect to leaders, the h-index methodology is quite productive and even overcomes some deficiencies visible in the context of scholarly work. First of all, leaders in networks like scholars in academia produce content, which is aimed at specific audiences and seek endorsement for their work in terms of citations or 'likes' and retweets. Secondly, both academic papers and blog messages increase their value through references, with the growth well documented and easily accessible. Thirdly, academics and leading bloggers both tend to increase their visibility by producing the maximum possible high-quality content. Moreover, the ample quantity of blog posts overcomes the limitations of academic work, where the number of contributions is usually lower.

Therefore, the use of h-index seems justified in the context of this research, as it addresses the issue of outliers (i.e. highly popular tweets) as well as the lifespan of accounts (immature, yet highly popular accounts) and provides a weighed rank of significant contributions—the major topic of this study. To put it simply, the h-index algorithm finds an 'ideal point' between the number of contributions and their relative popularity. In this research we consider popularity as the sum of 'likes' and retweets for each user's post, which is treated similarly to published academic contribution. Therefore, the utilized algorithm finds such an 'ideal point' for each leader in our community. Furthermore, all leaders were ranked according to the obtained indices and the obtained list was compared with the ranked list of leaders, obtained through the index method proposed by this research. Spearman's rank correlation coefficient (ρ) was utilized to establish whether both methods were concordant. It demonstrated a high correlation coefficient of 0.79 between the proposed influence index and the modified h-index. Notably, this coefficient was calcuated when the h-index did not refer to the centrality parameter of each leader account. Including the centrality indicator increased the correlation coefficient to 0.93.

As a ranking algorithm, the h-index provides a useful method for establishing the most influential contributors and can be used for ranking leaders. It also confirms the validity of the proposed complex time-invariant influence rank. As any other methods, the h-index for Twitter is not without deficiencies and potentilly may not be used for samples where leaders are highly popular and produce a large quantity of 'tweets'. As the Twitter REST API limits access to 3200 most recent posts, the h-index will not be able to produce and index higher than the quantity of posts. Yet in the case of current measurements of Russian Twitter, this issue was not a problem, as the most popular user - Alexei Navalny - scored only 902 points on the scale. Overall, the findings from both indices are consistent with other evidence, presented in this paper, particularly with network structure of three main political communities, where major influencers are located in the centre and have an impact on the entire network. Moreover, the findings do not contradict the common wisdom and the actual disposition of actors and organizations on the political arena.

5 Conclusion

Focusing on the dynamic environment of Russian Twitter, the research posited and evaluated certain problems identified in the literature. It found that several notable internationally recognized phenomena are highly applicable to the Russian segment of the network. Furthermore, it found a high correlation between the sociological and political construct of Russian society and several unique features of politics in the country, reflected online.

Firstly, as evidenced through hashtag and keyword use, Twitter was heavily used for protest purposes and mobilization during the days of mass protest actions in the summer of 2017. Regardless of the lack of aggregate ability of these events in inspiring widespread discussion, it appears that the platform was

instrumental during the protest days. It hence leads to the perception that the major 'reason' of using Twitter in Russia is not to disseminate information but instead for mobilization.

Secondly, the 'echo chambers' theory, widely observed internationally, well applies to Russian Twitter. There seems to be little ability of users in one community to influence or spread information to those in another—most especially for users in the two opposing pro-government and non-systemic opposition communities. At the same time, the presence of a third central community between the two opposing ones made up of highly influential leaders, demonstrates that there is a community that performs a different function—its members are seen as a source of valid and reliable information for the whole political network. Indeed these influencers use their central position not only to disseminate their own content but also retweet content from other communities.

Thirdly, it is unlikely that 'bots, regardless of their high numeric quantity, are readily able to affect discussions in real political communities. Considering the positions of such 'botnets' on the edges of the network, the 'distance' between them and many real users, as well as the high segregation of the whole network, both in terms of modularity and homophily, demonstrates that evaluations of the influence of 'bots' must take network structure into account.

Future research shall therefore be focused on the detailed analysis of accounts and content shared within each community, including the variance in generated sentiment in general and in relation to specific events in particular, such as the mass protest actions. It must also include analysis of retweeting and information dissemination patterns, as this would focus the discussion on the efficiency of information cascades and the ability of account groups or individual users to influence targeted communities and control the discussed agenda. It would also allow a targeted evaluation of communication strategies of both the government and opposition camps and possibly lead to assessments on their success or failure.

References

- Adamic, L. A., & Glance, N. (2005). The political blogosphere and the 2004 US election: divided they blog. In Proceedings of the 3rd international workshop on link discovery (pp. 36–43).
- Alexanyan, K., Barash, V., Etling, B., Faris, R., Gasser, U., Kelly, J., ... Roberts, H. (2012). Exploring russian cyberspace: Digitally-mediated collective action and the networked public sphere. *Berkman Center Research Publication No. 2012-2*.
- Aro, J. (2016). The cyberspace war: propaganda and trolling as warfare tools. *European View*, 15(1), 121–132.
- Baarda, R. (2017). Digital democracy in authoritarian Russia: Opportunity for participation. *Digital Media* Integration for Participatory Democracy, 87.
- Bakshy, E., Hofman, J. M., Mason, W. A., & Watts, D. J. (2011). Everyone's an influencer: quantifying influence on Twitter. In Proceedings of the fourth acm international conference on web search and data mining (pp. 65–74).
- Barberá, P. (2014). Birds of the same feather tweet together: Bayesian ideal point estimation using Twitter data. Political Analysis, 23(1), 76–91.
- Barberá, P., Jost, J. T., Nagler, J., Tucker, J. A., & Bonneau, R. (2015). Tweeting from left to right: Is online political communication more than an echo chamber? *Psychological science*, 26(10), 1531–1542.
- Bastian, M., Heymann, S., Jacomy, M., et al. (2009). Gephi: an open source software for exploring and manipulating networks. *Icwsm*, 8, 361–362.
- Brandes, U., Delling, D., Gaertler, M., Görke, R., Hoefer, M., Nikoloski, Z., & Wagner, D. (2007). On finding graph clusterings with maximum modularity. In *Graph-theoretic concepts in computer science* (pp. 121–132).
- Brundidge, J. (2010). Encountering difference in the contemporary public sphere: The contribution of the Internet to the heterogeneity of political discussion networks. *Journal of Communication*, 60(4), 680-700.

- Colleoni, E., Rozza, A., & Arvidsson, A. (2014). Echo chamber or public sphere? Predicting political orientation and measuring political homophily in Twitter using big data. *Journal of Communication*, 64(2), 317–332.
- Currarini, S., Jackson, M. O., & Pin, P. (2009). An economic model of friendship: Homophily, minorities, and segregation. *Econometrica*, 77(4), 1003–1045.
- Deibert, R., & Rohozinski, R. (2010). Control and subversion in Russian cyberspace. Access controlled: The shaping of power, rights, and rule in cyberspace, 15–34.
- Eltantawy, N., & Wiest, J. B. (2011). The Arab Spring—social media in the Egyptian revolution: reconsidering resource mobilization theory. *International Journal of Communication*, 5, 18.
- Enikolopov, R., Makarin, A., & Petrova, M. (2016). Social media and protest participation: Evidence from Russia.
- Etling, B., Alexanyan, K., Kelly, J., Faris, R., Palfrey, J. G., & Gasser, U. (2010). Public discourse in the Russian blogosphere: Mapping RuNet politics and mobilization. *Berkman Center Research Publication* No. 2010-11.
- Etling, B., Roberts, H., & Faris, R. (2014). Blogs as an alternative public sphere: The role of blogs, mainstream media, and TV in Russia's media ecology. Berkman Center Research Publication No. 2014-8.
- Gainous, J., Wagner, K. M., & Ziegler, C. E. (2017). Digital media and political opposition in authoritarian systems: Russia's 2011 and 2016 Duma elections. *Democratization*, 1–18.
- Gehlbach, S. (2010). Reflections on Putin and the Media. Post-Soviet Affairs, 26(1), 77–87.
- Gel'man, V. (2015). Political opposition in Russia: A troubled transformation. *Europe-Asia Studies*, 67(2), 177–191.
- Gibson, R. K., & McAllister, I. (2015). Normalising or equalising party competition? Assessing the impact of the web on election campaigning. *Political Studies*, 63(3), 529–547.
- Gorny, E. (2006). Russian LiveJournal. The impact of cultural identity on the development of a virtual community. Control+ Shift: Public and Private Usages of the Russian Internet, 73–90.
- Gorny, E. (2009). Understanding the real impact of Russian blogs. Russian Analytical Digest, 69(09).
- Greene, S. (2012). Twitter and the Russian street: memes, networks and mobilization. *Center for New Media and Society Working paper*, 1.
- Halberstam, Y., & Knight, B. (2016). Homophily, group size, and the diffusion of political information in social networks: Evidence from Twitter. *Journal of Public Economics*, 143, 73–88.
- Jacomy, M., Venturini, T., Heymann, S., & Bastian, M. (2014). Forceatlas2, a continuous graph layout algorithm for handy network visualization designed for the gephi software. *PloS one*, 9(6), e98679.
- Jaitner, M., & Mattsson, P. A. (2015). Russian information warfare of 2014. In 7th international conference on cyber conflict: Architectures in cyberspace (CyCon) (pp. 39–52).
- Keen, A. (2011). How Russia's internet 'hamsters' outfoxed Putin. Retrieved from http://www.cnn.com/2011/12/13/opinion/andrew-keen-russia/index.html (Acessed 1 August 2017.)
- Kelly, J., Barash, V., Alexanyan, K., Etling, B., Faris, R., Gasser, U., & Palfrey, J. G. (2012). Mapping Russian Twitter. Berkman Center Research Publication No. 2012-3.
- Koltsova, O., & Koltcov, S. (2013). Mapping the public agenda with topic modeling: The case of the Russian LiveJournal. *Policy & Internet*, 5(2), 207–227.
- Kwak, H., Chun, H., & Moon, S. (2011). Fragile online relationship: a first look at unfollow dynamics in Twitter. In Proceedings of the sigchi conference on human factors in computing systems (pp. 1091– 1100).
- Lawrence, A. (2015). Social network analysis reveals full scale of Kremlin's Twitter bot campaign. Retrieved from https://globalvoices.org/2015/04/02/analyzing-kremlin-twitter-bots/ (Acessed 1 August 2017.)
- Litvinenko, A. (2012). Role of social media in political mobilization in Russia. In *Conference for e-democracy* and open government (p. 181).

- Lotan, G., Graeff, E., Ananny, M., Gaffney, D., Pearce, I., et al. (2011). The Arab Spring— the revolutions were tweeted: Information flows during the 2011 Tunisian and Egyptian revolutions. *International journal of communication*, 5, 31.
- Mertens, M. (2006). Thieves in cyberspace: Examining music piracy and copyright law deficiencies in Russia as it enters the digital age. U. Miami Int'l & Comp. L. Rev., 14, 139.
- Murthy, D., Powell, A. B., Tinati, R., Anstead, N., Carr, L., Halford, S. J., & Weal, M. (2016). Automation, algorithms, and politics— bots and political influence: a sociotechnical investigation of social network capital. *International Journal of Communication*, 10, 20.
- Myers, S. A., & Leskovec, J. (2014). The bursty dynamics of the twitter information network. In *Proceedings* of the 23rd international conference on world wide web (pp. 913–924).
- Newman, M. E. (2006). Modularity and community structure in networks. Proceedings of the national academy of sciences, 103(23), 8577–8582.
- Nocetti, J. (2011). "Digital Kremlin": Power and the Internet in Russia. Russie. Nei. Visions(59), 5.
- Oates, S., Owen, D., Gibson, R. K., et al. (2006). The internet and politics: citizens, voters and activists. Routledge.
- Onuch, O. (2015). EuroMaidan protests in Ukraine: Social media versus social networks. Problems of Post-Communism, 62(4), 217–235.
- Page, L., Brin, S., Motwani, R., & Winograd, T. (1999). The pagerank citation ranking: Bringing order to the web. (Tech. Rep.). Stanford InfoLab.
- Potapova, R., & Gordeev, D. (2015). Determination of the internet anonymity influence on the level of aggression and usage of obscene lexis. arXiv preprint arXiv:1510.00240.
- Reuter, O. J., & Szakonyi, D. (2015). Online social media and political awareness in authoritarian regimes. British Journal of Political Science, 45(1), 29–51.
- Rosvall, M., Axelsson, D., & Bergstrom, C. T. (2009). The map equation. The European Physical Journal-Special Topics, 178(1), 13–23.
- Sanovich, S., Stukal, D., Penfold-Brown, D., & Tucker, J. (2015). Turning the virtual tables: Government strategies for addressing online opposition with an application to Russia. In Annual conference of the international society of new institutional economics.
- Sedykh, I. (2017). Rynok internet-torgovli v RF. HSE.
- Sindelar, D. (2014). The Kremlin's Troll Army. The Atlantic, 12.
- Towner, T. L., & Dulio, D. A. (2012). New media and political marketing in the United States: 2012 and beyond. Journal of Political Marketing, 11(1-2), 95–119.
- Tremayne, M. (2014). Anatomy of protest in the digital era: A network analysis of Twitter and Occupy Wall Street. Social Movement Studies, 13(1), 110–126.
- Tselikov, A. (2014). The tightening web of Russian internet regulation. Berkman Center Research Publication No. 2014-15.
- Tufekci, Z., & Wilson, C. (2012). Social media and the decision to participate in political protest: Observations from Tahrir Square. Journal of Communication, 62(2), 363–379.
- Tyler, T. R. (2002). Is the internet changing social life? it seems the more things change, the more they stay the same. *Journal of Social Issues*, 58(1), 195–205.
- Vendil Pallin, C. (2017). Internet control through ownership: the case of Russia. *Post-Soviet Affairs*, 33(1), 16–33.
- Wang, J., & Paschalidis, I. C. (2015). Botnet detection using social graph analysis. Arxiv preprint. Retrieved from https://arxiv.org/abs/1503.02337
- Waters, R. D., & Williams, J. M. (2011). Squawking, tweeting, cooing, and hooting: Analyzing the communication patterns of government agencies on twitter. *Journal of Public Affairs*, 11(4), 353– 363.
- Watts, D. J., & Dodds, P. S. (2007). Influentials, networks, and public opinion formation. Journal of consumer research, 34(4), 441–458.
- White, S., & McAllister, I. (2014). Did Russia (nearly) have a Facebook revolution in 2011? Social media's challenge to authoritarianism. *Politics*, 34(1), 72–84.

- Wolfsfeld, G., Segev, E., & Sheafer, T. (2013). Social media and the arab spring: Politics comes first. The International Journal of Press/Politics, 18(2), 115–137.
- Xenos, M., Vromen, A., & Loader, B. D. (2014). The great equalizer? patterns of social media use and youth political engagement in three advanced democracies. *Information, Communication & Society*, 17(2), 151–167.

Zherebtsov, M. (2018). Taking stock of Russian eGovernment. Europe-Asia Studies, Forthcoming.

Zherebtsov, M., & Goussev, S. (2017). Kremlin tweets: the politics of social media in Russia.

A Collected databases of politically relevant Twitter discussions

No	Event description	Dates	No	No
			tweets/RTs	users
1	2 nd anniversary of the annexation of Crimea	Mar 5-22, 2016	3.7K/9.2K	7.8K
2	2016 Eurovision Song Contest (the victory of the Ukrainian singer Jamala)	May 8-22, 2016	181k/183.6K	118.7K
3	The infamous Dmitry Medvedev's comment in Crimea regarding the index- ation of pensions (" there is no money in the budget but you hold on")	May 21-30, 2016	21.5k/22.8K	17.9K
4	The release of Nadezhda Savchenko from Russian prison (Ukraine's mili- tary officer, convicted for the murder of Russian journalists during war in Eastern Ukraine)	May 21-30, 2016	100.7K/99.6K	42.6K
5	Arrest and indictment of Nikita Belykh for corruption (the liberal governor of Kirov oblast)	Jun 19-28, 2016	38.7K/46.2K	25.3K
6	The attempted coup in Turkey	Jul 16-19, 2016	144K/127.4K	50K
7	Presidential elections in the United States of America	Nov 7-13, 2016	343.2K/316K	129.4K
8	Arrest and indictment of Alexei Ulyukaev for corruption (the federal min- ister for Economic Development)	Nov 15-20, 2016	85.1K/86.2K	35.9K
9	Putin's annual address to the Federal Assembly of Russia	Dec 1-5, 2016	6K/8.2K	8.7K
10	2 nd anniversary of Boris Nemtsov's assassination	Feb 25-Mar 3, 2017	$16.7 \mathrm{K}/42.4 \mathrm{K}$	17.6K
11	The release of the investigative documentary film "He Is Not Dimon to You" about alleged corruption by Dmitry Medvedev, produced by Alexei Navalny's Anti-Corruption Foundation	Mar 1-4, 2017	19.4K/39.7K	21.4K
12	The release from prison of Ildar Dadin (famous opposition personality)	Feb 24-Mar 5, 2017	7K/12.4K	7.9K
13	The release a CNN Special Report by Fareed Zakaria on Putin, "The Most Powerful Man in the World"	Mar 15-17, 2017	84.9K/23.6K	64.4K
14	3 rd anniversary of the annexation of Crimea	Mar 15-25, 2017	34.6K/66.5K	29.8K
15	The assassination of Denis Voronenkov (Russian political refugee and for- mer deputy of the State Duma)	Mar 23-25, 2017	39K/62.4K	25.2K
16	Public protests in Russia against corruption, inspired by the "He Is Not Dimon to You" documentary	Mar 25-Apr 1, 2017	$165 { m K}/374 { m K}$	94.5K
17	French presidential elections	May 5-7, 2017	$49.1 { m K}/34 { m K}$	22.9K
18	Public protests in Russia against corruption and their aftermath (massive arrests)	Jun 12-21, 2017	170.7K/250.7k	88.4K
19	1 st meeting of Vladimir Putin and Donald Trump	Jul 7-10, 2017	19.9K/27.4K	19.8K
20	Reaction to debate between Alexei Navalny and Igor Strelkov broadcast live on YouTube	July 13-22, 2017	$3\overline{2.7\mathrm{K}}/69.2\mathrm{K}$	28.8K
21	Reaction of Russian politicians to new US sanctions on Russia	Jul 27-Aug 5, 2017	23.3K/45.4K	20.7K
22	Vladimir Putin's vacation and fishing in Southern Siberia (N.B. pictures from vacation of Russian president went viral on the internet)	Aug 3-7, 2017	3.3K/9.2K	9.4K