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This research investigates to which extent activity of a social movement on a social networking site is related to participation in the offline collective action. We use the data from 17 online groups representing the branches of the movement for Fair Elections in 17 districts of St.Petersburg, Russia, and compare their online parameters to real offline participation of group members in elections in the role of observers. With around 12,000 online users and over 200 offline participants, we use social network analysis and statistical analysis to obtain our results. We find that both on the group and the individual levels participation is related to online networking features and activity parameters, albeit to a modest degree, and offline leaders are especially different from the rest of the members in terms of most online features.

JEL classification: Z19.

Keywords: social movements, online communities, social networks, participation, Russia.

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Introduction

For more than two decades researchers from various fields have been exploring how the new information and communication technologies (ICTs) influence politics, government, and political participation. It now seems obvious that the most prominent citizens' political campaigns and social movements of the past decade were born digital. Arab Spring, Occupy Wall Street, los indignados, to mention a few of them, make the best examples here. Social movements' scholars are increasingly interested in how the digital media affect the dynamics of mobilization for protest events, recruitment of new supporters, organization and coordination of their activities.

In line with this, since the mass protests started in Russia in 2011, researchers have tried to answer questions on causes, dynamics and outcomes of this mobilization. A visible body of literature has emerged recently that relates protest participation to internet consumption both in Russia and in other parts of the world, however, much less is known about the role of social movements' deliberate online activity and participation in those movements outside periods of mass mobilization.

This paper aims at filling in this gap. Focusing on the case of "Observers for Fair Elections" movement in St.Petersburg, we obtain unique comparative data from 17 city districts and seek to find out what has driven high participation in some of them and low participation in others. While most conditions are the same in all districts, their group pages on a social networking site are dramatically different, and we seek to determine if this is related to the offline participation rates. We seek to answer the questions: How are features of online communities maintained by social movements related to offline participation rates? How does an individual's activity or position in a movement's online community predict his/her offline participation? Are online and offline leaders the same persons or some kind of division of labour may be observed?

Internet, protests and social movements

The majority of works on social movements and digital technologies focuses on relation between individual internet usage and participation in street protests. The latter, usually seen as non-institutionalized or even disruptive forms of political participation, analytically differ from more regular contentious political action channelled through social movements. However, the body of literature on protests is rich and full of relevant insight, albeit its results are somewhat contradictory.

Thus, the study of the environmental protests in the UK and Romania confirms that involvement in online activities such as discussions of events on social media platforms increases political participation in both conventional and unconventional forms of protest (Mercea, 2011). Based on studying the US activist websites Earl and Kimport (2011) suggest that digital technologies make protest actions more 'affordable' through lowering transaction and organizational costs and through aggregation of people's individual action into a broader collective action without the necessity of co-presence. Qualitative studies of the *los indignados* movement indicate the particular importance of the digital media for the coordination and optimization of the events (see e.g. Flesher-Fominaya, 2014), while some poll-based research underscores the informing role of the internet. Thus, Anduiza et al. (2012) find that *los indignados* learnt about the protest significantly more frequently from online media and social networking sites than did the participants of other protests in Spain.

A similar situation is seen in the large body of studies on the Arab Spring. Lim points at a brokering role that social networking sites played during the Arab Spring establishing "connections between previously disconnected groups, to spread shared grievances beyond the small community of activist leaders" (2012). Tufeksi and Wilson (2012) use survey data from Tahrir square in Egypt to show that Facebook has been the main source of information about the protest.

Likewise, in the post-Soviet space a whole series of protests has been analysed. Qualitative research on the Ukrainian Orange revolution in 2004 and revolution in Moldova in 2009 indicated that ICTs can be highly instrumental in mobilizing supporters, organizing protests events, fund raising as well as promotion of democratic ideas across wider population (Kyj, 2006; Lysenko and Desouza, 2010 and 2012). Analysing Internet and social media usage during the protests in Russia in 2011, Litvinenko concludes that "protesters were mobilized mainly via social networks sites such as Vkontakte and Facebook" (2012). Volkov (2012) cites results of poll carried out at the places of street protests and shows that Internet (70%) and personal friendship ties (30%) became the most important sources of information on protest events in Russia.

It thus may be seen that while many researchers observe mobilizing, coordinating and identity-forming role of the Internet, statistical evidence has been so far available only regarding the dominance of the internet among sources of information about protest events. This fits with the study by Koltsova and Kirkizh (2015) who find that individual participation in lawful

demonstrations is reliably predicted with the use of the internet as a source of news across 55 countries. Paradoxically, the study of 20 Arab countries reveals negative correlation between internet penetration and the share of protesters (Wolfsfeld et al, 2013). He concludes that the countries with lower internet penetration are usually the countries with more problems to be resolved by protests.

This brings us to the on-going discussion on whether the Internet should be seen as a cause or just as a catalyser of protests, while true causes should be sought for separately. Following Dalton and van Sicke's reflections and literature review (2005), the main factors that make a protest possible may be grouped into several broad categories: grievances / perceived deprivation, values / political culture, resources, and (perceived) opportunity structure / perceived efficiency. Grievances are viewed as the situation when people think they have less than they are entitled to. Protests are thus seen to be better predicted with dissatisfaction than with absolute unemployment or inflation rates. For instance, regarding the Arab Spring, perceived corruption and religious cleavages, among others, are being mentioned as main causes of this turmoil (Tsirel, 2012, Allagui and Kuebler, 2011). Political culture influences protests by maintaining beliefs about appropriateness of certain forms of political action. Thus, traditional culture is usually passive, while postmaterialist values create a more participatory culture. Resources are seen as factors that make a protest "technically" possible. They include personal skills, available time, communication technologies and generally political institutions that either allow or do not allow any protest or political change through it. These latter are also termed political opportunity structure (POS). For protest to occur, both real favourable POS and belief in its efficiency is important.

In addition, following the point by Welzel and Deutsch (2012), it may be said that all these factors can have a stronger effect when they are observed not only at the individual, but also at the group level. For instance, if a person sharing a certain value observes high prevalence of the same value in his/her community, the probability of acting according to this value – e.g. to protest – for this person will be higher. Welzel and Deutsch call this an "ecological effect". We thus expect to see ecological effects of online behaviours in online communities on individual offline participation in social movements. However, we do not expect online community features to be the *causes* of offline participation; rather, we expect some of them to stimulate the latter.

Here it is important to note that unlike street protest participation, participation in a social movement is a somewhat vague category. In their most classical definition, social movements

are viewed as "networks of informal relationships between a multiplicity of individuals and organizations, which share a distinctive collective identity, and mobilize resources on conflictual issues" (Diani 1992). What follows from this definition is the absence of clear-cut boundaries between participation and non-participation. Ultimately, the former is usually measured through involvement into distinct movements' activities that possess a contentious component, such as offline gatherings, petition signing, money donation, and others.

Thus, de Zúñiga et al (2012) measured participation with an index that included group membership, attending public hearings, writing, calling and talking to public officials and some others. They found that the informational use of social media, but especially the use of those for political expression, correlated with offline (and online) participation. Other works do not differentiate between social movement participation and protest participation. Hwang et al (2015) constructed an index that included fund-raising for charity, volunteering, signature-seeking, rallying and boycotting. Finding four clusters of media consumption in Korea, the authors reveal that participation is most likely to be found among users preferring traditional media and social networks, followed by internet and social media users. Nah et al (2006) defined participation in relation to a certain issue – a movement against the war in Iraq in the USA in 2003. They included such activities as demands addressed to media to express alternative views, banners displays at home, petition signing, money donation, protest / rally participation, and some others. TV use was found to be negatively related to political participation, while newspaper and internet use were related to it only indirectly, through offline and online political discussion which they produced and which, in turn, influenced participation.

This slim stream of literature, again, focuses on individual use of the internet, while potential influence of a person's online networks and online communities, including those supported by the movements themselves, has been largely ignored. This is surprising because social movement participation research, unlike that on protest participation, has established that sense of community is a strong factor (see e.g. Cicognani et al., 2012). Closely related are shared group identification, perceived group-based injustice, and beliefs about the group's efficacy (Klandermans, 1997; Van Zomeren et al., 2008; Mazzoni et al, 2013). Another line of research has since long been investigating the role of (offline) social networks for mobilization, recruitment to and participation in social movements (for an overview see Diani 2004). He suggests that participation in a specific group and sharing the group's identity increase individual's chance to get involved in the social action. In turn, activists' multiple group membership creates linkages between various organizations, and therefore social movements are

always “embedded in dense relational setting” (2004). Given that, social movements themselves may be defined through the notion of network or web. This latter concept and that of community, or group, seem to be inseparable, especially in the context of the online reality. A well-known early definition of the online communities regards them as “social aggregations that emerge from the Net when enough people carry on those public discussions long enough, with sufficient human feeling, to form webs of personal relationships in cyberspace” (Reingold 1993). These webs may be easily operationalized through graphs built of declared links, such as friendships, and communicative links, such as comments, likes or reposts.

However, to the best of our knowledge, whether online communities maintained by social movements are able to contribute to offline mobilization, is still a question for further research. Some scholars have studied the use of the internet by social movements (Della Porta and Mosca 2005; Stein 2009); others have concentrated on analysis of the content produced by online-only movements (Earl 2006; Caren et al 2012), but no link between movements’ online efforts and their offline size has been sought for. Our hypothesis is that larger and more connected online communities producing more content would generate higher offline participation rates. We also expect that individuals who are more central in the networks of friendship or liking or commenting, and who are themselves active in content contribution, will more likely to participate offline. They may even be offline leaders.

Here it is important to note that when offline participation is predicted with online data, it always deals with rank-and-file participants, while it has been widely acknowledged that presence of efficient leaders may be crucial for the movement’s emergence, maintenance and outcomes (for overview see Morris and Staggenborg 2004). As noted by Diani (2003), since social movement participants often reject authoritative leadership and domination, leaders in this context are those whose position in the centre of exchange of practical or symbolic resources gives them a possibility to solve problems crucial for social movements. Diani offers to define social movement leaders directly through their network positions (2003), but it may be argued that ultimately leaders are those who are recognized as such, while their network positions may be indicators or proxies for leadership. It is following this logic that we hypothesize that not only rank-and-file participation, but also participation in the leading roles may be predicted or partially explained based on the data from the movements’ online communities since these data include network information. This does not mean that the central role in an online community causes offline leadership, but if the former turns to be a reliable predictor of the latter, it may contribute to our understanding of leadership in today’s social movements.

Case description

The social movement "Observers for Fair Elections" in Saint Petersburg emerged during the mass protests against alleged fraud at the national parliamentary elections in Russia held on December 4, 2011, and in the anticipation of the presidential elections that were to be held on March 4, 2012. In between the movement managed to mobilize around 3000 volunteers that acted as observers at voting stations and collected vast data describing what the activists perceive as the methods of electoral fraud.

The movement of "Observers" in Saint Petersburg started in digital media, namely Russia's most popular social networking site Vk.com (otherwise called VKontakte, akin to Facebook). Online networking platforms allowed citizens to express their frustration openly and in the way they felt most comfortable: through photographs, cartoon pictures, statistics that they collected on polling stations or just angry blog posts. An "Observers for Fair Election" online group was established on December 4, 2011. During the first week, people only shared their stories and experiences and called for the mass actions to make the parliament dissolve.

On December 12, the group administrator reported incredible membership growth: from few hundred to more than 5 thousand in less than one week. Simultaneously, 17 district groups were established, and soon they started coordinating their actions.

> *Up till January it [the movement] existed in the form of district communities, and in January we decided to unite. We have united in January and made up a name and decided that it would be an association of "Observers in Saint Petersburg". The idea of association is exactly the association of the city districts. (Female activist, 40 years old)*

The preparation for the presidential elections in early 2012 not only became the highlight of the Movement's mobilization in St.Petersburg. It also gave rise to various grass-root initiatives came into being to deal with issues of urban planning, housing services monitoring, migrants' integration, volunteering, educational programmes, etc.

In turn, district groups of the 'Observers' movement had their own potential of becoming sub-communities with their distinct identities because voting is organized locally, with varying level of fraud dependent on local officials, which means that observers' activity demands coordination on this local level. This was especially true when it came to observers' efforts to become members of local counting committees that they perceived to be crucial for fraud prevention.

According to them, the main method of fraud at the presidential elections was distortion at the stage of vote count by district counting committees, not at the stage of vote collection. After the presidential elections the movement was particularly successful in promoting approximately 2000 its members into counting committees, however, they had a very disappointing experience during the next elections. These were the joint gubernatorial and municipal elections of St.Petersburg held on September 14, 2014. According to the observers, the main source of fraud here was pre-term voting that amounted to 10-15% of vote and produced only pro-incumbent votes. Membership in counting committees thus became useless for fraud prevention.

In addition to this, Observers have reported increasing pressure they have been experiencing since their start, and forced emigration of some of the movement's founders. High level of perceived risks for the movement's members has made the community very closed and reluctant to share the data and to let researchers do field research. Thus, several attempts to organize offline polls, particularly to ask community members to nominate their leaders, did not succeed.

Data

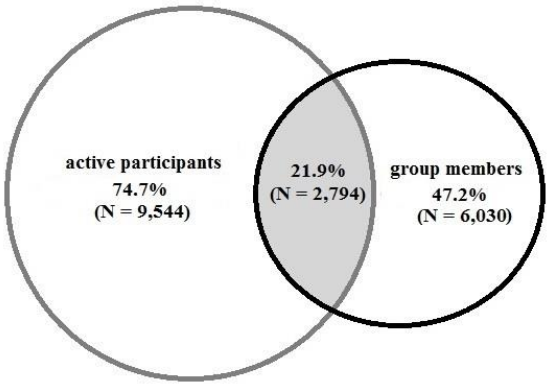
Online data were retrieved from group accounts of each of the 17 district branches of the movement in VK.com with our (Lab's) software VKMiner. The 18th was the city-level group of Observers that linked to all its district branches. None of the Observers' group sis protected by privacy settings, and therefore all are open for legal downloads. The eleven downloads performed weekly before and after Saint Petersburg gubernatorial and municipal elections (September 14, 2015) included all publically available demographic data, group membership, friendship ties, comments, likes, and posts in groups produced by the group members and non-member VKontakte users.

Multiple downloads were made to trace the process of mobilization before the upcoming elections, but no substantial change in group composition or structure was found. Therefore, a cross-section analysis was done based on the download from September 23, 2014.

We thus investigate activity of 12,778 participants who have ever been active in district groups (left likes, comments or posts) and/or been members of at least one of these groups. A member is defined as a person who has formally registered in a group, whether s/he has or has not produced any content. An active participant is a person who has left at least one post, like or comment in one of the 17 groups, regardless of him/her being a member. Both categories are termed participants. In total, 9,544 people out of 12,778 were active in at least one district group, while

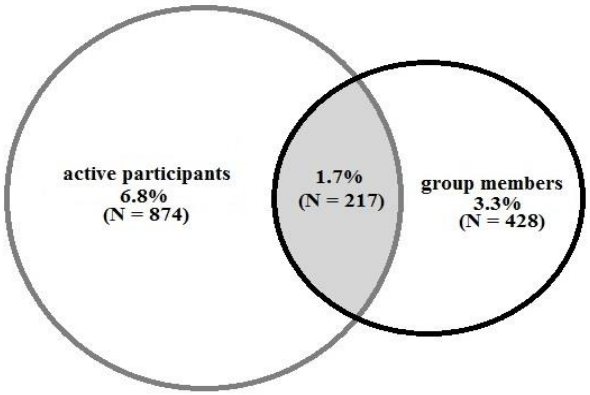
only 6,030 were members of at least one group. The two sets intersect at the amount of 2,794 people who were both: group members and showed any activity in at least one of the district communities (see figure 1). A considerably lower amount of members was active and/or shared membership of two or more district communities (see figure 2).

Together, local groups users generated 2,326 posts, 11,249 comments and 33,375 likes during the entire period of the groups' existence (December 2011 – September 2014). We also collected data on friendship links within each of 18 groups (including the all-city one), and between all 22,494 participants.



Participants N = 12778

Fig. 1. All participants



Participants N = 12778

Of them multi-participants N = 1085

Fig. 2. Participants active in or belonging to ≥ 2 groups, among all participants

This data was supplemented with information on offline movement members who actually attended the poll stations in the role of observers, counting committee members, and some other independent roles (see full list of roles in supplement 1). This data was collected by the Observers' call centre during the elections day on September 14th, 2014 based on in-coming and outgoing calls from / to the observers registered in the Movement's list. Individuals were considered offline participants if they confirmed their presence at the poll station. At the next stage they were manually matched to their VKontakte accounts, and that have shown 257 of around 300 offline participants were also members of one or more online groups. To help with the interpretation of the network analysis that "hardly derives straightforwardly from network properties" (Diani 2002) we conducted ten in-depth interviews with the movement leaders and rank-in-file members. In total, 74% of those 89% group members who indicated their city

claimed to be from St.Petersburg, while age and gender distribution did not differ from the overall VKontakte distribution.

The groups visibly differ in size: from 37 to 535, excluding Pushkin district (mean = 285.5, St.dev. = 138.1). Pushkin also differed manifestly with a much lower proportion of multi-group members (10% against 52-72%). The group, with more than 2,000 members, was five times larger than average. In the overall network of friendship it also formed a distinct cluster, while all the others belonged to an unstructured core. Unlike all the rest that experienced a visible decrease in the number of messages right after the presidential elections in 2012, Pushkin was much more active than even the all-city group during the entire years 2012 and 2013. As was learned from the group content and from the interviews, this group's activity became much broader than electoral observation right after the presidential elections were over. Pushkin, in fact, is not an in-city district, but a satellite town of suburban type, isolated geographically and with its distinct identity of imperial summer residence (like Petrodvorets). Contrary to Petrodvorets, it has recently faced a number of ecological and town-planning problems, and the group was used as a resource for the local mobilization. It was renamed "Citizen Pushkin", and elections were no longer mentioned in its goals. This means that structural difference of the Pushkin group from the rest clearly indicated the difference of the offline part of this sub-movement. Therefore, Pushkin was excluded from the further analysis as an outlier, leaving us with 16 districts.

The structure of data sets some limitations on the analysis. The data are not strictly two-level: membership in the upper level is not only multiple, but cannot be defined since some persons only produce content, others only register as members, and some do both, often in different groups. These are very different ways to be associated with a group and we found they cannot be meaningfully represented as a set of multiple memberships. Therefore we refused from fitting a multi-level multiple-membership regression and had to analyse each level separately.

Online and offline participation at the district level

At the district level, the number of people who participated in the elections in different offline "activist" capacities correlate with each other. Therefore, we use the overall number of all types of offline activists aggregated by district as the target variable. The entire dataset contains 69 variables, 51 of which have been used in the analysis (see full list in table 1 in appendix). They

can be divided into four major groups: (1) absolute numbers (e.g. number of members or likes in a group, 17 variables), (2) the same numbers weighted by the off-line district population (17 variables), (3) numbers weighted by the online group size (e.g. posts per user, 10 variables), and (4) network metrics such as density and modularity that also contain some weighting on group size (9 variables). At the first stage of the analysis we check how different network characteristics and online activities correlate to the offline activism. Next, we run the cluster analysis to find out the common pattern of features inherent to districts that have more active citizens.

According to the information from the interviews with activists as well as literature (Gladarev, 2013) we expected to find more contentious activity in downtown districts, while the dormitory areas are expected to be more passive being inhibited by young generation of citizens and new-comers who do not feel strong connection to the city. These differences are even more visible given that downtown districts have strong movements for the protection of the historical sights and thus people acquire competences necessary for the activism (friendship links, communication and organization skills).

As determined by Pearson correlation coefficient, the offline participation rate (i.e. the number of participants per 10,000 of the district population) has a strong association with many features of online groups. First, it is highly and positively related to the weighted group size ($r(16)= .906$ $p\leq 0.001$). Second, it is also related to such network features as the normalized number of friendship links between users ($r(16)= .925$, $p\leq .001$), modularity **(**$r(16)= -.539$ $p\leq .038$), share of isolates **(**$r(16)= -.789$ $p\leq .001$) and the average number of friends per user ($r(16)= .866$, $p\leq.001$). However, the relation to the median number of friendship links in each group ($r(16)= -.003$, $p\leq .993$), as well as to density ($r(16)= .398$, $p\leq .127$), is not significant. We can see that larger groups with more links are associated with higher offline participation, although cohesiveness is not so important. What is important is absence of well-defined cluster structure and low share of isolates – that is, loose, but even connectedness is more relevant for offline participation than tightness of online friendship network.

Offline participation rate is also positively related to some parameters of the group activity weighted to the size of district population, for instance, the number of posts authored by individual users who are not administrators, ($r(16)=0.805$, $p\leq0.001$), and to the number of comments ($r(16)=0.505$, $p\leq0.046$). Comments outnumber posts and, as is known from qualitative text analysis, it is there where expression of political opinion mostly takes place. Participation

rate is not related either to the weighted number of comments or the relative number of posts, comments and likes per user. It is possible that likes do not express a group's devotion to offline participation, while content that demand more involvement does.

It is important to note that most variables also correlated with each other. For instance, all variables that are related to offline participation rate are also related to the weighted group size (except weighted number of comments and diameter). It is hard to single out one variable that would be the "cause" of all the rest, but, as we had expected, bigger, more connected and more content-rich groups seem to be produce more offline participation. We therefore performed cluster analysis to see if indeed the districts with higher participation rates would fall together in a cluster and also demonstrate higher values of some other variables.

We have used different sets of variables to obtain different solutions, based on four groups of variables mentioned in the *Data* section. When selecting the number of clusters, we optimized it by distance to centroids, inter-cluster distance, and silhouette. The first metric decreased monotonously with the growth of the number of clusters in all solutions, while the other two would sometimes suggest three clusters instead of two. However, three-cluster solutions would either break the smaller cluster in two, or add a cluster with one or two elements. Since our hypothesis was to find an "active" minority cluster and a "passive" majority cluster, we concentrated on examining two-cluster solutions. We also examined distributions of each variable over districts separately to find that most of them fell monotonously, but some revealed clear thresholds.

Three downtown districts – Admiralteysky, Petrogrardsky and VO – clearly differed from the others by the number of offline participants weighted by the district population, and seemingly by a number of other variables. However, our cluster analysis gave a bit different results. Table 2 shows how the composition of the "active" cluster changes depending on the selection of variables (only the most important solutions are shown). We define the "active" cluster as the one that includes observations with higher values of variables involved. When absolute numbers, such as the number of members, are included, the downtown districts – Admiralteysky, Centralny and VO – merge with three periphery districts. When the effect of the absolute sizes is eliminated (starting from solution 3), only Admiralteysky and VO stay in the active cluster. Solution 5 employs a selection of variables that have the best thresholds in their distributions over districts that seemed to separate Admiralteysky and VO, or Admiralteysky, VO and Petrogradsky from the rest. All these variables happen to fall into category two – absolute

numbers weighted by the offline population. However, this selection of variables happens to place Admiralteysky and Centralny into the active cluster. It is also interesting that Pertrogradsky never falls into the active cluster.

It is obvious that cluster solutions are sensitive to variable composition, but the districts that most often appear in the active cluster are still Admiralteysky, VO and Centralny – three downtown districts. Districts from Solution 1, plus Petrogrogradsky, form a group that significantly differs from the rest not only by offline participation (weighted by the district population), but by some other important weighted variables, such as the number of members, edges, posts, likes and comments (t-test sig < 0.05).

Table 2. "Active" cluster composition in different cluster solutions (K-means)

District shortened name and type		solution 1	solution 2	solution 3	solution 4	solution 5	solution 6
		Groups of variables present in solutions					
		1;3;4	1;3	2;3;4	2;3	2	2 select
Admiralteysky	Downtown	•	•	•	•	•	•
Centralny	Downtown	•	•				•
Frunzensky	"Dorm"						
Kalininsky	"Dorm"						
Kirovsky	"Dorm"	•	•				
Kolpino	Suburb						
Krasnogvarfeysky	"Dorm"						
Krasnoselelsky	"Dorm"						
Kurortny	Suburb						
Moskovsky	"Dorm"						
Nevsky	"Dorm"	•					
Petrodvorzovy	Suburb						
Petrogradsky	Downtown						
Primorsky	"Dorm"	•	•				
VO	Downtown	•	•	•	•	•	
distance to centroids		1794400	1793600	4438,9	4426,9	3573	978,69
inter-cluster distance		2840,6	2840,6	222,81	222,45	221,44	110,95
silhouette		0,47	0,47	0,61	0,61	0,59	0,62

Individual participation in elections monitoring

The activity and/or embeddedness in the local online community of the Observers are related to an individual's participation in offline elections' monitoring, but not as much as at the aggregate level. Variables in this analysis can be divided into three categories indicating how active the individual is in online discussions, how much feedback he or she receives online and how strong her or his connection with the online community is (see table 3). The correlation analysis indicated strong relation between some of these variables; for instance, the number of comments is strongly associated with the number of likes ($r\ (12{,}778) = .876$, $p \leq 0.001$) and the number of communities to which a user belongs is related to the number of his/her friends ($r\ (12{,}778) = .583$, $p \leq 0.001$). In addition, outgoing communication and received feedback obviously strongly correlate with each other (see table 4 in appendix).

Tab. 3. Individual Participation Indicators

		Min.	Max.	Mean	Std. Deviation
Personal Activity	Sum of posts	0	69	0.18	1.341
	Sum of comments	0	821	0.88	9.232
	Sum of likes	0	2357	2.61	24.886
Received feedback	Sum of received comments	0	67	0.2	1.873
	Sum of received likes on posts	0	25	0.08	0.781
	Sum of received likes on comments	0	20	0.02	0.29
Embeddedness in a community	Activity in groups	0	17	0.89	0.938
	Membership in groups	0	17	0.54	0.829
	Friendship links in groups	0	705	2.67	14.792
	Mean friendship links in groups	.000	143	1.631	4.622

Notes: Total N = 12778 participants, Observers N = 257, Online-only participants N = 12521

As the share of offline participants among online participants is small (2%) we ran a number of binary logistic regressions with penalized likelihood, including those with backward elimination. In these models the dichotomous dependent variable 'offline participation' was predicted

through different combinations of variables from the three aforementioned types, so as to avoid multicollinearity, plus with the two available control variables: gender (male/female) and city of residence (St.Petersburg or not).

Tab. 5. Regression analysis of the individual participation

	Model 1	Model 2	Model 3	Model 4
(Intercept)	-6.605*** (0.328)	-6.620*** (0.329)	-6.622*** (0.329)	-6.741*** (0.321)
Sum of posts	-0.053 (0.038)	-0.076* (0.037)	-	-
Sum of comments	-0.002 (0.026)	-	-	-
Sum of likes	-	-0.263* (0.092)	-	-
Sum of received comments	-	-	-	0.107*** (0.031)
Sum of received likes on posts	-	-	-0.002 (0.041)	-
Sum of received likes on comments	0.005 (0.054)	-	-	-0.135** (0.081)
Active in groups, No	0.252*** (0.046)	0.334*** (0.049)	0.208*** (0.040)	0.231*** (0.040)
Member of groups, No	0.137*** (0.035)	0.142*** (0.036)	0.138*** (0.035)	-
Total friendships links	-	-	-	0.085*** (0.033)
Mean friendship links	0.202*** (0.033)	0.220*** (0.033)	0.197*** (0.033)	-
Gender	0.900*** (0.136)	0.895*** (0.136)	0.906*** (0.136)	0.957*** (0.135)
City	1.416*** (0.243)	1.422*** (0.224)	1.429*** (0.243)	1.527*** (0.245)
Nagelkerke's pseudo R^2	0.117	0.122	0.115	0.098

We show the best models in table 5; since all interval variables were normalized to the same scale prior to modelling, their regression coefficients are directly comparable. Standard errors are reported in parentheses under regression coefficients. Models 1 and model 2 indicate that a person's activity online is negatively related to the offline participation, while the amount of feedback has no influence at all. Comparison of Models 1-4 also shows that the strongest predictors for the offline participation are the number of friendship ties in district communities, as well as the number of district groups in which a user is a member and especially in which s/he has shown some activity (i.e. posts, comments or likes).

Therefore, we reject one of our hypotheses: our data confirms that individuals producing more content in movements' online communities are not those who take part in offline electoral observation. Nonetheless, another hypothesis is supported by our data: the big amount of friendship connections in the online communities point at the offline activists. Thus embeddedness in the community is more important than online communication. It should be noted that the variation between online-only participants is dramatically high and therefore on the individual level online data do not predict offline participation well. The highest pseudo-R2 that could be reached in the logistic regression modelling with these data was 0.127. All models are significant, but of modest explanatory power. It thus means that individual offline participation of online group members is determined by other factors, not available from the online data.

Matching together the individual and the district levels without multilevel modelling is difficult, still we can formulate some assumptions. It looks like large group size, high connectedness and high activity in group do indicate large numbers of offline participants in the respective districts, but those participants are definitely not those who are more active online and not necessarily those who are more central. It may mean that the group's activity on the whole, not the person's activity produces higher offline participation rate, which confirms the importance of Welzel and Deutsch's notion of ecological effect. This means that individuals who finally go to the voting stations to observe may be inspired not by their own online activity, but by the overall activity and the size of their district group. However, the causality may also be opposite: in those districts where some hidden conditions exist, high offline participation emerges that also gives rise to online activity – in particular, among those people who do not go to the polling stations themselves. Thus the overall volume of a district's online activity is a reliable indicator, but not necessarily the cause of its offline activity. Interviews seem to support the second assumption on

causality. As informants tend to think, where a group of active and tightly connected leaders formed quite fast, the activity has lasted sustaining through the time.

Online features of offline leaders

With such importance of leadership we sought to operationalize the concept and to study it in-depth. First, two researchers formed a list of candidate leaders from informal examination of the online data. Then the movement leader was pointed at by independent offline sources. This leader also identified a list of leaders, according to what seemed subjectively right, after which she was asked to name formal district coordinators. While coordinators had been elected at the latest meeting of the Movement's members, and thus presented "objectified" leadership, nomination was absolutely subjective. Both approaches have their advantages and limitations. Defining leaders through elections is free from subjectivism; however, it is unclear how well these persons fulfil their leadership duties, if at all. This type of leadership may be regarded as "formal". Nomination, on the other hand, may capture real reputation, still it does not tell us who really influences behaviours, and, furthermore, it may be based on persons' online visibility. This may lead to self-fulfilling predictions. However, in this explorative part of our research we have had no better data on leaders. The latter type of leadership may be regarded as "informal" or "perceived". It should be noted that the researchers' list of candidate leaders was used only as a sanity check to make sure that the nominations by the only available nominator were not made at random.

Tab.6. Mean online activity of group members according to their status

	Posts	Comments	Likes	Received commence	Received likes on posts	Received likes on comments	Active in group(s), No	Member of groups, No	Edges
Informal leaders (N=21)	4.810	32.143	65.667	5.048	3.000	0.333	6.619	6.619	23.955
Offline elections observers (N=244)	0.020	0.132	0.269	0.021	0.012	0.001	1.541	1.152	4.337
Online participants only (N=12513)	0.166	0.791	2.450	0.181	0.074	0.016	0.872	0.517	1.541

Two “intuitive” lists – by researchers and by the offline leader – were highly correlated (Spearman and Kendall coeff. = 0.8, $p < 0.01$, obtained from the list of all group members divided dichotomously into leaders and non-leaders), which means that the researchers had guessed most judgements of the nominator. Both intuitive lists correlated to the formal leaders list with $r=0.580$, $p<0.001$. This perhaps indicates difference between formal and informal leadership. We then sought to determine which online properties best explain the informal leadership. It turned out that leaders are much more active in their online communication than rank-in-file activists or online group members and are located in the centre of friendship networks in online communities (see table 6). In addition they, receive up to three times more attention and feedback to their online entries than regular participants.

In addition, table 6 confirms our conclusions from the previous section on the individual activity: offline participants tend to produce less online content but on average have more friendship ties.

Interestingly, when informants were shown the friendship networks and asked to comment on them, several said that these networks reflected relations of the past, which corresponded to early 2012 when the movement emerged. However, it turns out that centrality in friendship network is important both for leadership prediction and offline participation prediction. This may mean that although declared online friendships are static and may fail to reflect some offline changes, they play a role of accumulated social capital whose influence on behaviour lasts longer than actual friendships. This finding poses a methodological question about a period of time during which centrality may be used in analysis as the indicator of such accumulated social capital.

Conclusion and discussion

From the analysis above, we can conclude that online footprints of social movements may be very informative, although these data should not be used straightforwardly. Thus, on the individual level it became evident that that those people who participate in offline actions are considerably different from those who produce content in online communities. Nonetheless, the friendships network analysis showed that activists and leaders take more central positions in those networks. However, the relation between online features and individual offline participation is weak, while it is much more visible on the group level. This suggests presence of an ecological effect: larger, more connected and more active groups produce higher levels of offline participation, but not necessarily among those who are active online. This may mean that online traces inspire those who are not necessarily inclined to be visible online. At the same

time, online presence may reflect the existence of an active offline core produced by efficient offline leadership rather than by online activity. Offline leadership, too, seems to be related to online presence. However, leadership within a single movement is an extremely rare event that may produce only preliminary conclusions.

Still, a measurable relationship between online and offline realms of an important social movement has been documented in this case study, and this indicates a direction for further research. First, it is necessary to find out to what extent these conclusions may be generalized. This may present a difficulty – it is hard to find cases of social movements to compare that are similar to each other in virtually every respect, except internet footprint. In our case, these were district branches of the same movement in the same city operating in the same time that gave us a fertile ground for conducting a quasi-experiment and allowed comparison. Therefore, it might make sense to find more urban or national movements with local branches to replicate this study. Second, more work is needed to define and measure of leadership in order to clarify its role for movements' maintenance and its relationship to the online features of individuals. Here, longitudinal analysis may be very helpful since it can allow seeing what comes first: leadership, and then online presence of a movement, or spontaneous online mobilization, and then crystallization of leaders who get involved in offline activities and then into the movement's maintenance.

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APPENDIX

Table 1. District Level Variables

	Minimum	Maximum	Mean	Std. Deviation
Total Offline Participation	.00	62.00	29.625	17.651
Members	37.00	535.00	285.500	138.103
Posts in Group	183.00	1338.00	572.625	336.585
Posts by Users	.00	547.00	216.187	160.670
Isolates	18.00	187.00	89.125	41.782
Edges	.550	19.403	5.312	5.458
Connected Vertices	19.00	370.00	196.750	100.024
Connected Components	22.00	199.00	92.625	45.312
Multi-Vertex Connected Components	2.00	12.00	6.125	3.284
Vertices in Max Connected Component	11.00	339.00	184.062	94.705
Edges in Max Connected Component	32.00	3647.00	1383.625	1023.309
Single group members	14.00	291.00	111.312	71.575
Multi-group members	23.00	271.00	165.062	71.181
Multi-group members excluding all-city	16.00	123.00	72.062	29.356
Posts	261.00	1645.00	788.812	363.960
Comments	9.00	1975.00	660.312	550.990
Likes	17.00	3971.00	1024.937	1088.816
Members weighted to population	5.09	23.60	10.387	6.070
Posts weighted to population	8.96	84.55	31.841	21.762
Posts in Group weighted to population	5.42	64.39	22.933	17.608
Posts by Users weighted to population	.00	31.67	8.909	8.183
Isolates weighted to population	1.86	6.07	3.151	1.275
Edges weighted to population	5.51	194.03	53.419	54.696
Connected Vertices weighted to population	2.62	18.12	7.246	4.855
Connected Components weighted to population	1.40	6.63	3.321	1.438
Multi-vertex connected components weighted to population	.09	.57	.235	.153
Vertices in Max Connected Component weighted to population	1.51	17.89	6.775	4.728
Edges in Max Connected Component weighted to population	4.40	193.80	52.740	54.312
Total Offline Participation weighted to population	.00	3.59	1.066	.955
Single group members weighted to population	1.67	9.81	3.912	2.340
Multi-group members weighted to population	2.97	15.00	6.178	3.850
Multi-group members excluding all-city weighted to population	1.33	6.72	2.821	1.780
Comments weighted to population	1.24	73.02	23.730	21.735

Likes weighted to population	2.34	175.41	37.752	45.429
Posts per user	38.40	100.00	70.863	19.188
Share of posts per user	.00	61.60	29.137	19.188
Share of isolates	21.60	48.60	32.869	6.267
Share of Vertices in Max Connected Component	57.90	98.70	91.456	9.512
Share of Edges in Max Connected Component	80.00	99.90	97.381	4.768
Share of multi-group members	41.57	72.12	61.251	8.233
Share of multi-group members (excl. all-city)	17.87	43.24	28.110	6.135
Share of Comments per user	.24	5.47	2.109	1.290
Share of Likes per user	.46	8.50	2.987	2.244
Median Edges	0	8	1.69	1.815
Density of Max.Connected Component	.05	.58	.111	.128
Density	.02	.12	.042	.025
Diameter	4.00	11.00	7.438	1.548
Average Distance	1.63	3.41	2.897	.430
Average degree	2.16	16.80	8.685	3.509
Average degree in max. connected component	5.82	21.66	13.317	4.110
Modularity	.23	.34	.265	.035
District population	72648.00	534646.00	307141.31	150222.320

Tab. 4. Pearson Correlation: Individual participation

	Offline Participation	Sum of posts	Sum of comments	Sum of likes	Sum of received comments	Sum of received likes on posts	Sum of received likes on comments	Activity in groups	Membership in groups	Friendship links in groups	Mean friendship links in groups	Gender
Offline Participation	1	.074**	.052**	.024**	.075**	.065**	.009	.139**	.162**	.172**	.124**	.066**
Sum of posts	.074**	1	.286**	.130**	.556**	.758**	.278**	.481**	.220**	.313**	.124**	.036**
Sum of comments	.052**	.286**	1	.876**	.265**	.236**	.184**	.331**	.133**	.364**	.145**	.033**
Sum of likes	.024**	.130**	.876**	1	.074**	.108**	.088**	.316**	.116**	.358**	.128**	.016
Sum of received comments	.075**	.556**	.265**	.074**	1	.522**	.474**	.228**	.124**	.147**	.081**	.038**
Sum of received likes on posts	.065**	.758**	.236**	.108**	.522**	1	.338**	.331**	.165**	.223**	.136**	.026**
Sum of received likes on comments	.009	.278**	.184**	.088**	.474**	.338**	1	.108**	.057**	.075**	.061**	.009
Activity in groups	.139**	.481**	.331**	.316**	.228**	.331**	.108**	1	.153**	.434**	.066**	.015
Membership in groups	.162**	.220**	.133**	.116**	.124**	.165**	.057**	.153**	1	.583**	.360**	.091**
Friendship links in groups	.172**	.313**	.364**	.358**	.147**	.223**	.075**	.434**	.583**	1	.559**	.047**
Mean friendship links in groups	.124**	.124**	.145**	.128**	.081**	.136**	.061**	.066**	.360**	.559**	1	.071**
Gender	.066**	.036**	.033**	.016	.038**	.026**	.009	.015	.091**	.047**	.071**	1

** *Correlation is significant at the 0.01 level (2-tailed).*

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