
The Formation of Political Discourse within Online Networks: The Case of the Occupy Movement

Jorge Fábrega

School of Government,
Universidad Adolfo Ibañez,
Santiago, Chile
E-mail: jorge.fabrega@uai.cl

Javier Sajuria

Department of Political Science,
University College London,
London, UK
E-mail: j.sajuria@ucl.ac.uk

Abstract: How does political discourse spread in digital networks? Can we empirically test if certain conceptual frames of social movements have a correlate on their online discussion networks? Through an analysis of Twitter data from the Occupy movement, this paper describes the formation of political discourse over time. Building on an a priori set of concepts, derived from theoretical discussions about the movement and its roots, we analyze the data to observe when those concepts start to appear within the networks, who are those Twitter users responsible for them, and what are the patterns through which those concepts spread. Our findings show that, although there are some signs of opportunistic behavior among activists, most of them are central nodes from the onset of the network, and shape the discussions across time. These central activists do not only start the conversations around given frames, but also sustain over time and become key members of the network. From here, we aim to provide a thorough account of the "travel" of political discourse, and the correlate of online conversational networks with theoretical accounts of the movement.

Keywords: Social Networks; Social Movements; Discourse; Collective Action.

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Biographical notes:

Jorge Fábrega received his PhD in Public Policy at the University of Chicago. He is Assistant Lecturer at the School of Government, Universidad Adolfo Ibañez. His research interests include the study of mechanisms used by individuals to face cooperation and conflict. In particular, he is interested in markets, regulations and networks. He is author of a book on petty corruption, combining elements of rational choice theory, political economy and social network analysis.

Javier Sajuria is a PhD Candidate in Political Science at University College London. His research interests include political behavior, social media, social movements and political participation.

1 Introduction

The emergence of political discourse is generally a mediated experience. Either through mainstream media or elites, different discourses arouse and – sometimes – influence public opinion (Zaller, 1992). Since social movements are essentially contentious against elites (Tarrow, 2008), they have developed different "repertoires of action" (Tilly & Tarrow, 2007) to overcome these barriers. For years, the use of illegal, violent or non-violent actions has been sufficient to raise media awareness and reach broader audiences. However, the formation of the discourse had been usually restricted by geographical and temporal constraints. Moreover, elites within the movements have been historically in charge of this process.

The advent of new technologies, particularly Twitter and other social network sites, allows for a new type of conversation between the members of the movements, mainstream media, and the general public (Boyd, Golder, & Lotan, 2010). In turn, these conversations propose new questions about the generation of political discourse through online interactions. This paper is an attempt to answer these questions. We use the Twitter datasets from the Occupy Research project (www.occupyresearch.net) to provide a detailed account of how political discourse is created and spreads through Twitter conversations – mainly through mentions and retweets. From there, we aim to explain how certain concepts can travel through the network and who are those Twitter users responsible for that. In order to achieve this, we use the level of betweenness centrality of individuals across conversations as a relevant indicator to be observed.

The paper starts with a revision of the literature on political discourse formation. It then examines the Occupy movement as a research option, providing a discussion on how different political frames influenced the movement, and how they were essential throughout the months it took place. Subsequently, we provide a brief description of the datasets used for the paper, alongside the methods used to analyze them. Finally, a discussion of the results is provided, with a clear emphasis on the potential benefits of using network theory and methods to understand discourse formation.

2 The Formation of Political Discourse

The emergence of collective views about political topics has always been an interesting puzzle. It requires a combination of political knowledge about the issue (Mansfield & Sisson, 2004; Zaller, 1992), media framing (Fujiwara, 2005; Gerring, 1999; Schnell, Karen Callaghan, 2001), and shared spaces for conversation (Boyd et al., 2010; Hampton, Livio, & Sessions Goulet, 2010).

When it comes to discourse, Berg and Lune point out that *"the interesting aspect of (...) discourse is not merely what is said, or which words are used, but the social construction and apprehension of meanings thus created through this discourse"* (2011, p. 364). On that regard, political discourse refers to the actual meaning of the political discussions that people hold, both privately and publicly. The emergence of that discourse, then, is embedded in the different constructions and social understandings of those participating in the discussion.

Discourse differs from an objective frame or policy position in the sense that it requires dialogue and discussion in its creation.

The literature suggest that most people do not hold high levels of political knowledge (Ansolabehere, 2005). Hence, most discussions take place among informed elites, who have access to limited sources of information, and the time to absorb and deploy it. However, the emergence of new technologies is, allegedly, reducing the entry barriers to political information. Online political outlets expand the options for accessing political information. Yet, they do not necessarily increase people's interest in becoming informed (Stanley Weare, 2004; Weaver Lariscy, Tinkham, & Sweetser, 2011). As a result of this high level of availability of political information, we might not see people acquiring more political knowledge, but instead having increasing difficulties distinguishing "the signal from the noise". Information and communication technologies (ICTs) then, might not be a definite solution to increasing people's political knowledge. This affects the formation of political discourse, as it affects the availability of useful information, and its inclusion in the process of construction of discourse.

The media plays a key role in shaping public discourse, either by framing issues in a certain way, or by expanding the views of some elites (Graber, 2003; Iyengar, 1987, 1994). In the case of recent social movements, the use of ICTs has proven to be fundamental for activists to reach mainstream media outlets (Theocharis, 2012). In this way, the actions – and omissions – of the media, shape public discourse. However, as mentioned above, the process of connecting political actors with journalists requires a message established a priori, which has been already defined by those leading the movement – the elites.

It is within the conversation between those related to the movement where political discourse gets created. A traditional process of hierarchical decision-making requires elites to take up people's opinions, and deliberate in closed instances. However, the use of social media is changing this process in an interesting way. Regardless of the intentions of elites to maintain the status quo, platforms such as Twitter allow any user to comment, discuss, and converse within a public environment. As Boyd et al. explain,

"(B)ecause Twitter's structure disperses conversation throughout a network of interconnected actors rather than constraining conversations within bounded spaces or groups, many people may talk about a particular topic at once, such that others have a sense of being surrounded by a conversation, despite perhaps not being an active contributor" (2010, p. 1)

Hence, it is not only elites, or even activists who shape political discourse on Twitter. Even people who do not aim to participate in the conversations may become exposed to them, and eventually participate.

The contribution of this paper refers to the possibility of social media for bringing new questions and possibilities for discourse formation. The relevance of the information networks in framing political issues deserves a closer look. How do certain topics reach broader audiences, while others do not? Who is responsible for placing those topics within conversations? How do those processes evolve over time? This is a broader research agenda in which this paper aims to contribute to. We believe that the literature presents a gap in understanding this particular process of discourse formation in the light of the differences that social media are bringing. If we establish that ICTs create new dynamics to the way in which people interact and discuss different issues, then we could conclude that the formation of political discourse is changing. The consequences of this are not only methodological, but also in the content and spread of discourse.

3 The Frames Behind the Occupy Movement

The start of the Occupy movement relates to two specific – and subsequent – events. On September 16, 2011, the Canadian online magazine *Adbusters* posted a call to occupy Wall Street, as a protest against the financial and political system. The next day, over 1,000 protesters gathered in Wall Street, and after clashing with the police, decided to occupy Zuccotti Park, a privately owned space. Within days, hundreds of public spaces were occupied around the US, and in other countries of the world ("Occupy Together | Home," n.d.)

Nevertheless, the movement was far from spontaneous. After the events of the Arab Spring in early 2011, followed by the *Indignados* protests in Spain, the occupation of public spaces such as Tahrir Square, Puerta del Sol or Plaza Catalunya- became an effective form of contention. The combination of a local – public – occupation, and the discussions sustained over the Internet fostered the emergence of broader frames, able to gather large numbers of people.

In terms of discourse, the Occupy movement relates closely to the *Indignados* protests in Spain. Both processes were framed as a struggle against inequality and abuses (Cabal, 2011; Castells, 2012). In fact, some scholars have suggested that the Occupy movement is the result of 30 years of class-struggle in the US (Chomsky, 2012).

In order to study the dynamic of discourse formation on the Occupy movement, we selected two frames. One frame talks about past and current discomfort, and the second one speaks of the desire of future relieve.

With respect to past and current discomfort, one of the most salient concepts amongst the Occupy protesters is the idea of "we are the 99 percent". With that, they reflect the feeling that there is a small minority of people, mostly bankers, who did not suffer the consequences of economic crises. Moreover, even if they might be deemed responsible for the crises, they usually get more money as a compensation for losing their jobs (Milkan, Luce & Lewis, 2013). It can be said that the sense of unfairness was one of the initial drivers of the movement. In this regard, the activists conversed around the topics of inequality and abuse. As a consequence, the frame "we are the 99 percent" refers to a conceptual boundary between "us" (those who suffer the abuses, the victims of inequality), and "them" (those who are responsible for the economic debacle, and do not suffer any consequence from it). This frame is preexistent to the actual Occupy movement, and some (Castells, 2012) would argue that it was the initial drive for the occupations.

While discomfort with such inequalities and abuses can be the initial driving force to collective action, social movements are not only set to fight against them but also to pursue something different. As Castells (2012) argues, there are several other elements that need to be considered when analyzing this, and other examples of recent social movements (such as in Egypt and Spain). Based on his work and others (Caren & Gaby, 2011; Juris, 2012; Occupy Research, n.d.), we have established another frame that, in our opinion, is informative regarding the expectations around the Occupy movement.

The second frame is based on the central idea behind Castells' (2012) work: Outrage and Hope. The emergence of these movements is an answer to a combination of events, where communication networks play a significant role. First, economic and political crises create outrage. Then, people with access to communication networks – such as Twitter – find others who feel the same. These networks of outrage become networks of hope when – through online conversations – people realize that they are not alone, and that there are options for organization and action. The final event is action. The point of this frame is

to understand when, and how, outrage becomes hope. The second frame, then, relates to the concept of hope, to the belief that collective action might be successful in producing the required change to overcome inequality. With these two frames, we have produced a research design intended to capture them from Twitter conversations, using social network analysis techniques.

4 Methods

4.1 Data Sources

Twitter operates as a microblogging platform, where users post messages, each one no longer than 140 characters. Unlike other social network sites, Twitter creates directed connections. That is, that a user can follow the tweets of another user without needing the permission of that user. Moreover, the fact that user A is following user B does not ensure that user B will interact with A. Hence, relationships based on follower/following status might not always be an optimal tool to construct networks. Instead, we use interactions between users as a way to create the edges between different nodes. Interactions can take the form of a mention (when a user writes another username in their messages), a retweet (when a tweet from another user is replicated verbatim, usually with a "RT" at the beginning of it), or a "via" (when a user quotes the message from another user).

The datasets used in this paper come from the Occupy Research project (www.occupyresearch.net), a crowdsourcing enterprise to study the Occupy movements around the world. In particular, the Twitter datasets were collected by R-Shief (www.r-shief.org) using the Twitter Streaming API during a period between September and December 2011. The period was selected as it corresponds to the onset of the movement, when most discourses ought to have been created. From all the datasets available, we used the one containing all the messages using the "official" hashtag of the movement: #ows.

The next step was the creation of the networks. First, using keywords, a dataset for each frame was created. For the frame related to inequality, the keyword selected was "99percent", which covers different variations of the hashtag "wearethe99percent". The frame related to the transformation of the networks from outrage to action, used the term "hope" as a proxy. We acknowledge that the selection of the terms using a deductive approach carries out some limitations. The messages might contain other terms that could be useful to observe the required relations, but filtering messages by the term "hope" serves as a first approximation. Nevertheless, this is an ongoing research agenda, and therefore further analyses will be required in the future to establish this proposition.

After filtering by the terms mentioned above, we generated two datasets of 25 thousand (for the "99 percent" frame) and 155 thousand tweets (for the "Hope" frame), including approximately 14 thousand and 44 thousand user accounts, respectively. Table 1 summarizes the data collected for each frame considered in this study

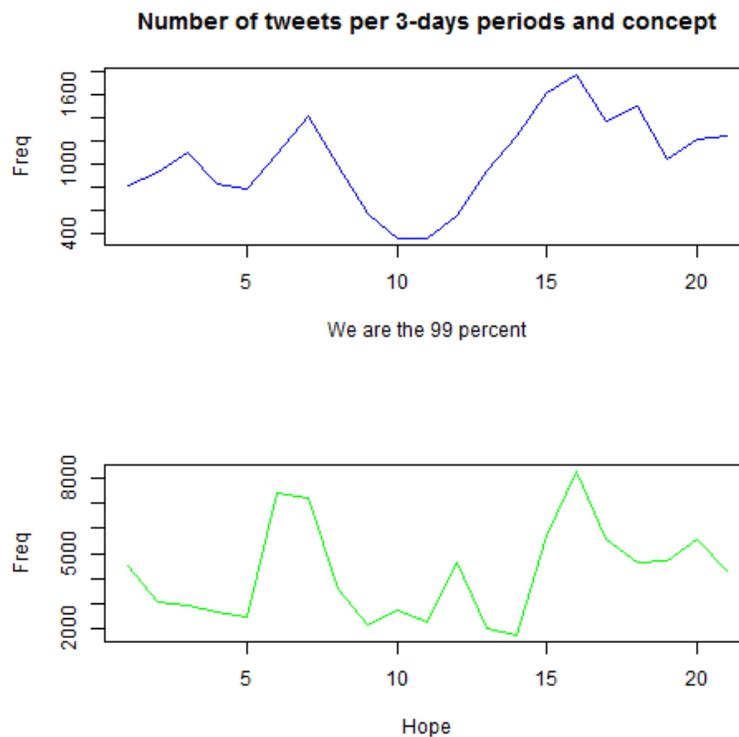
Second, given that the analysis covers a two-month (October and November 2011) period and also given that interactions in Twitter occur in shorter periods of time is it useful to split the dataset in intervals. We decided to use 3-day periods. This decision was made taking into consideration the way in which messages and relations are constructed on Twitter (Fabrega & Paredes, 2013). The idea was to have a period of time large enough to capture relevant interactions among Twitter users, but short enough to allow us to observe the diffusion of each topic-centered conversation over time.

Table 1 Descriptive statistics of the networks

	99 percent	Hope
Tweets	25,189	155,132
Retweets	16,081	89,684
Tweets with mentions	3,464	24,283
Unique users	14,564	44,864

Each 3-day period became a static network itself, which was, in term, analyzed as part of a longitudinal series. Also, each new incomer into the conversation was identified according with the 3-days period in which she wrote her first tweets on the topic.

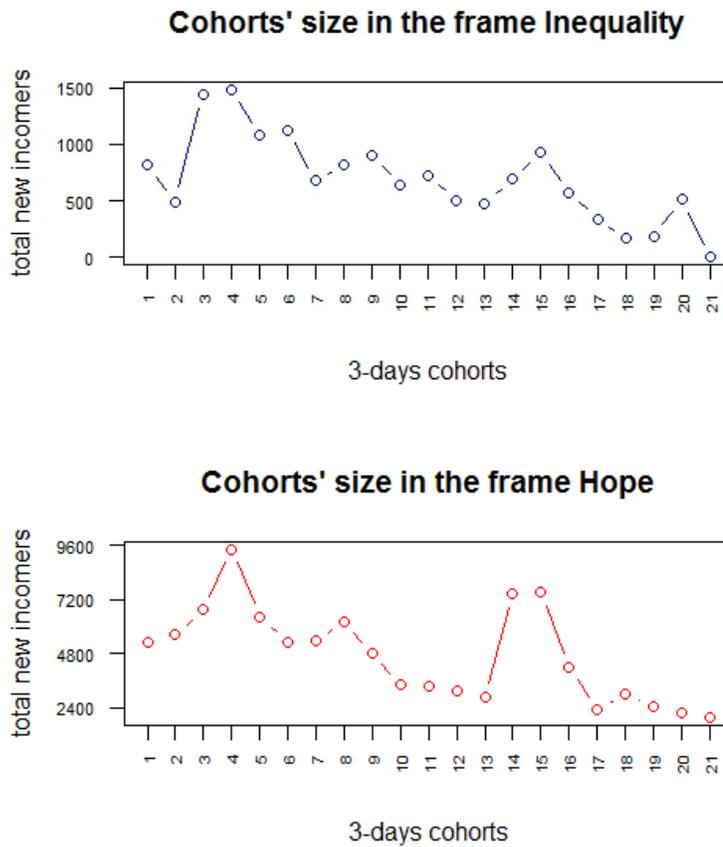
As it is show in Figure 1, both frames follow similar patterns in terms of frequencies of tweets. There are two main modes for each topic during days in which the movement was particularly intense; although, the frame related with inequality and abuse shows a smoothed curve.

Figure 1 Distribution of tweets per 3-days periods per each network

The main activity on Twitter associated with the OWS movement extended over almost four months. However, as it is shown in figure 2, discussions around the frames of inequality

and hope were adding new participants at decreasing rates. By the end of second month of the movement, most of the people who were sending new messages on inequality and related issues had records of previous participation on the topic. Consequently, it is along those two first months (or twenty one periods of three days) when the discourse is framed. This is consistent with what previous literature has described (Conover, Ferrara, Menczer, & Flammini, 2013).

Figure 2 New incomers into the frames on inequality and hope along time



4.2 Research Hypothesis

The exercise of understanding how many given conversations around a topic are constructed requires, mainly, a descriptive effort. In the case of the networks formed by Twitter discussions, the exercise is twofold. On the one hand, it is necessary to describe the network structure of the population. On the other, we need to provide a temporal account of how the network evolved to reach its final form.

Theoretically, the structure of networks can be described as points within two different extremes. On one extreme, we can find a completed graph with density one formed by a big community, where every member is connected to each other. On the opposite, there is a network with a large number of clusters, and a low – or inexistent – number of connections between them. In the case of the latter, we may assume that the transmission of the topic over time did not take place through contagion. Moreover, in that case, it might be important to observe some of the other elements for the formation of discourse, such as media framing or political knowledge. But it is when we find a large, somewhat densely connected network, when we need to start looking at its development over time.

In the case of discourse formation on Twitter, the network emerges through mentions of other users and retweets of their messages. Consequently, analyzing the network that grew up from retweets and mentions, we can observe how conversations evolve and the role that different user account can develop within those networks.

Since the networks are formed through interactions between users, on any given topic, there will be "activists" whenever we find users who are interested in making some topics more salient. When activists are present, they might be remarkably efficient in starting and spreading a given message or they might display opportunistic behavior, taking concepts that are already present in the conversation - but not necessarily salient - and bringing them to the center of the discussion. In both cases, those agents will behave as connectors impacting the dissemination of opinion, and consequently, we might be able to observe that role via a measure of betweenness centrality.

We chose betweenness centrality (BC) as our indicator. This measure, originally developed by Freeman (1977), is one of many options to analyze the level of centrality of a given node in a network. The particular feature of BC is that it does not focus merely on the number of ties directed to a given node (such as in degree centrality), but instead measures the number of shortest paths from one node to other that pass through this particular node. In that way, we are not only accounting for the position of the node in the network, but also for its relevance. Since our networks are based on the interactions via Twitter, nodes act as generators and broadcasters of information. They can start the transmission of information, but also serve as gatekeepers for it. Nodes with higher BC are also more powerful and relevant in the process of formation of collective discourse.

Consequently, averaging the betweenness centrality within each cohort serves as a proxy of the weight of that cohort in the dynamic of discourse formation on each particular frame. Naturally, a measure of betweenness centrality by cohorts will not distinguish between activists and occasional brokers within single cohorts. However, when individuals from given cohorts hold central positions in the network along a sequence of periods is reasonable to sustain that they are active promoters of that particular frame. This must be true because each cohort suffers from attrition. It means, with each new period, the occasional brokers who eventually gave salience to a cohort in the past will no longer be actively tweeting about the issue. Only those members of a past cohort who are true brokers in the conversation will be able to give to their cohorts a central role in future periods of the network. Consequently, computing the betweenness centrality of individuals in each period and averaging those measures within those who are part of the same cohort provides a conservative account on the relevance of a given cohorts in the dynamic of discourse formation.

Based on this, we can start describing the research hypotheses.

Hypothesis 1: Public discourse emerges from groups of activists who have an initial goal of making an issue salient and keep talking about it over time.

If this hypothesis is correct, we should observe small and identifiable groups of activists writing and spreading their message persistently over time. Their success is then measured against their ability to connect different groups who talk about the same issue.

In terms of the measurements required to test this hypothesis, the conversational networks should be centralized around these activists from the beginning. They would be the central nodes of the network from its onset, and they will be efficient in turning the topic into a trend.

Hypothesis 2: Activists display opportunistic behavior, taking topics that are already being discussed in the network, and activate them later.

This means that the network would initially present high levels of dispersion, where there is a significant amount of “noise”. Several topics would be discussed at the same time, but no one would be more relevant than the others, until the activists “mainly users that were not active in the network before” arrive and propel the issues.

In this case, we should observe a network where there are disperse, yet active nodes. After a given period of time, the activists who decide to take over the respective frame connect these nodes.

Hypothesis 3: There is a third possibility. It might be the case that the groups discussing a topic change over time.

That means that the frames remain constant and relevant, but the users talking about them change. In this case, we would expect a highly dispersed network with groups of users that quickly appear and disappear. This responds to the idea of cohorts and waves of participants who join the conversation at different points in time. Each wave has its own behavior, but they all discuss within the same frames.

Table 2 summarizes the heuristic behind the hypothesis

Table 2 Expected output consistent with each hypothesis

Hypothesis	Betweenness Centrality (BC)
H1	First incomers have higher BC and hold their central position along subsequent periods
H2	Cohorts with high BC do not appear from the beginning, but once they appear hold their relative centrality in subsequent periods
H3	There is no identifiable pattern of BC associated with any cohort

5 Results

According to our analysis, early incomers into the topic of inequality and hope become connectors in greater proportions than later participants during the period of discourse

formation. Figures 3a and 3b summarize this point. Each cell represents the average betweenness centrality of each cohort (labeled as 1, 2,... and 21, respectively) in a given period (labeled as bc01, bc02,..., and bc21, respectively). Blue (red) cells represent deviations to higher (lower) centrality values to the mean. Consequently, when a cohort (a column) is colored in blue in a given periods (a cell), it means that its average betweenness centrality is greater than the average betweenness centrality of all cohorts that are active at that period. And, when such a cohort has successive blue-colored cells period after period (cell by cell), it means that it is holding a relatively central position in the process of discourse formation.

Two remarkable patterns emerge from the figures. First, in both frames the main cohort with blue cells (higher values) was its first cohort (note that each frame has its own network and, consequently, the members of cohorts among frame are not necessarily the same individuals). In the case of inequality that position is in occasion shared with other cohorts (for example, cohort 3 in period 6), especially during the second month (for example, cohort 2 in period 13 and 19, cohort 5 in period 15, and cohort 18 in period 20). On the other hand, the first cohort held a central role during the entire two-month period regarding the hope frame. Given that occasional members of a cohort who could contribute to give central positions to the cohort in the past will no longer be contributing to that position in future periods of the discourse formation, the fact that an early cohort retains its relevance in subsequent periods is consistent with H_1 .

Second, other cohorts occupy central positions for short period of time (blue cells) mostly during the second month of the movement for both frames. By the beginning of the second month moreover, sixty percent of the users who wrote about one of these issues had already tweeted or retweeted on the topic using concepts like "we are the 99 percent" or "hope". Consequently, it can be argued that most of the discourse formation was already in place when new groups could capture attention and give centrality to the issue. In order for this second pattern to be consistent with H_2 , the cohorts who gained salience during the second month of the movement in a given period should hold their relevance within subsequent periods. In figures 3 and 4, there are a few instances in which that may be the case (for example, cohorts 2,5 and 9 in the frame of inequality; and cohort 11 in the frame of hope), but the evidence only provides weak support for H_2 . Nevertheless, further analysis is required for a better understanding of the relative explanatory power of both hypotheses.

6 Discussion

The process of discourse formation in a digital era does not seem to be fully decentralized, nor to be as spontaneous as Internet enthusiasts would like to claim. It might be the case that groups and individuals with particularly high levels of interest can take advantage of the massiveness and openness of digital media to frame public opinion. Data from the dynamic of Twitter interaction around two of the main topics raised by the Occupy Wall Street Movement seems to be consistent with that interpretation. We speculate that similar patterns would be observable in other types of social phenomena on Twitter. At least, it can be said that early bird participants during the Occupy Wall Street movement got (as a group) and advantage to frame the discourse around concepts that later became characteristic of the social movement.

This finding is relevant to answer part of a bigger question about the role of Internet in political activities. The utopian view of ICTs claims that they are able to modify (and

Figure 3 Average betweenness centrality by cohort during the period of discourse formation (Inequality)

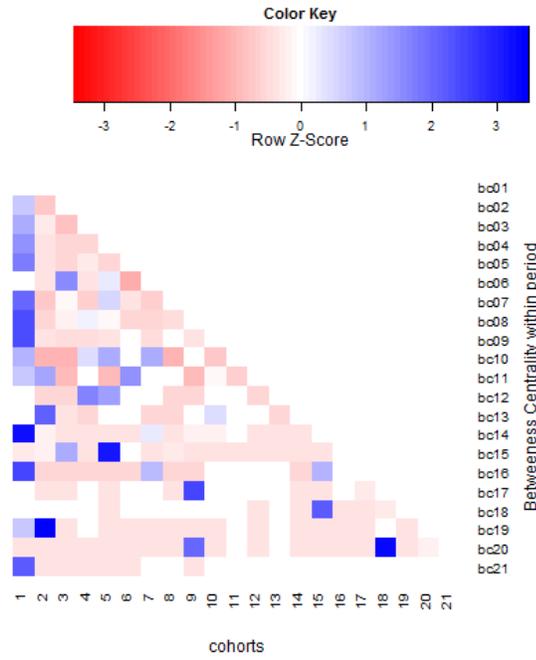
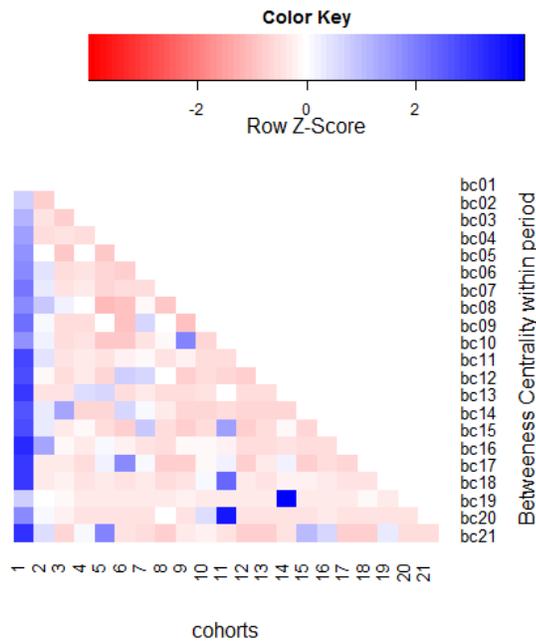


Figure 4 Average betweenness centrality by cohort during the period of discourse formation



enhance) the ability of citizens to participate in politics. The decentralized nature and the lack of geographical constraints would allow people to organize and act collectively more easily. However, our evidence is not consistent with that view. Online discourse formation, such as the traditional process, seems to rely heavily on early-comer elites. Those who are present at the onset of the movement become the relevant nodes and, hence, the leaders of it.

We have used the case of the Occupy movement as testing exercise for our hypotheses, but we also acknowledge that online networks occur beyond one case, and that Twitter does not account for all forms of digital interactions. Nevertheless, we believe that the size and relevance of this case for the current developments in social movement theory make it a good starting point. As we said earlier, this project is part of a wider research agenda, where comparisons between this and other theoretical expectations are required.

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