A Systematic Literature Review of Twitter Research from a Socio-Political Revolution Perspective

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Abstract

From a socio-political revolution perspective we review Twitter-related literature included in top peer-reviewed journals and conferences, and build up a comprehensive picture. Based on this we identify empirical and design-oriented research needs.

1. Introduction

Oh et al. [1] demonstrated that Twitter was used heavily for “collective sense making ... maintaining situational awareness during the unstable political situation” during the 2011 Egypt revolution [1, 210]. Our work evaluates Oh’s [1] results concerning Twitter usage for collective sense making and maintaining situational awareness for other revolutions and extends it by using Kuran’s theory [2] of (unanticipated) political revolution. We use Goldstone’s contemporary definition of revolution as “an effort to transform the political institutions and the justifications for political authority in a society, accompanied by formal or informal mass mobilization and noninstitutionalized actions that undermine existing authorities.” [3, p. 142].

Twitter is the world’s second most established social media platform after Facebook. Compared to other social media platforms, Twitter offers a rich spectrum of publicly available data containing profiles, up to 140 character messages (tweets), and following-follower network information. Besides the very popular private- and business-oriented use of Twitter and due to the generally public but time-limited availability of most data, Twitter offers a rich resource for research (cf. Twitter API).

Long before the advent of the internet and especially the evolution of social media outpaced this speculation. However, Kuran’s theory of (unanticipated) political revolution and the role of communication tools is very relevant in order to understand the power of social media such as Twitter within political revolutions. At the same time, it must be clear that Twitter does not lead the revolution. Rather Twitter is a tool effectively connecting people within a complex and non-linear social fabric (see for example the debate of Tumasjan et al. and Jungherr et al. [4]–[6]).

That is why – following the research call of various Information Systems (IS) scholars (e.g. [1]) – in this article we review all existing “substantial” scientific Twitter work related to the socio-political revolution perspective and build up a comprehensive literature review following Kuran’s theory [2]. Based on this review we identify empirically evaluable propositions and design-oriented research needs to stimulate future research on the theoretical progress of understanding the role of Twitter within socio-political revolutions and Twitter’s functionality of information and communication facilities during revolutions.

RQ₁: What are the research needs for understanding the Twitter usage phenomena during socio-political revolutions?

RQ₂: What additional Twitter functionalities are usable during socio-political revolutions?

The paper is organized as follows: In section 2 we present the research methodology. Section 3 contains related work. Kuran’s theory of unanticipated political revolution is sketched in section 4. The comprehensive review including the particular empirical and design-oriented research needs is presented in section 5. In section 6 a compacted framework guiding future research will be shown. Finally, the conclusion including research limitations and future work is found in section 7.
2. Methodology

On the basis of a systematic literature analysis identifying Twitter-related socio-political revolution publications, respective research requirements to foster Twitter usage studies will be identified. These needs will be formulated in the form of particular propositions ($P_x$) and technology-/ design-oriented calls ($D_x$). On that basis a framework guiding future Twitter research will be shown. The literature review body is structured based on Kuran's theory [2] of (unanticipated) political revolution.

2.1. Literature search strategy

In order to extract relevant research from the published literature, a systematic literature search capturing Twitter-related work from the beginning of 2006 until 06/01/2015 was undertaken. 18 meta-databases (i.e. ACM DL, AIS Electronic Library, Cambridge Journals, Emerald Online, IEEEExplore DL, INFORMS Pub, JSTOR, Mary Ann Liebert, Palgrave Macmillan Pub, SAGE, ScienceDirect, SpringerLink, and Swets Inf. Serv., Taylor & Francis Online, WileyOnline, MIT Press, ACS DL, PsycINFO) as well as the Journal of MIS (JMIS) were searched, resulting in over 2,100 articles that met the inclusion criteria (abstract or title or keywords contains “Twitter”).

Publications that were not related to the social network Twitter but related to birds/zoology etc. – which regularly also include the word “Twitter” – were removed from the database. In addition, a forward and backward search was performed (cf. [7]).

2.2. Quality criteria for study identification

To ensure including only “substantial” scientific crowdsourcing work in this review we only considered international peer-reviewed publications (journal articles and transactions) with completed research work. For reasons of quality, poster sessions, editorials, interviews, commentaries, conference proceedings (with the exception of ICIS, HICSS, ECIS, AMCIS), and RIP papers were not included.

After reviewing 848 articles included in top journals and conferences, 40 articles were identified as relevant within the Political Revolution domain (considerably addresses the political revolution area). The identification was based on a manual decision by two reviewers at a reliability of 98.8%.

3. Related work

Nine years after the launching of Twitter, scholars have contributed from different disciplines such as Information Technology, Information Systems, Sociology, Psychology, Philosophy, Politics, Communication Studies, Business Studies, Law, Medicine, Geography, Education Sciences, Administration Sciences, Journalism, and Linguistics with empirical, technical/design-oriented, and theoretical work. In addition, very subject-specific Twitter reviews exist: Bruns & Burgess [8] contained a small review on behavioral research methods for Twitter. Efron [9] shows a literature survey of Twitter retrieval methods, e.g., for sentiment analysis and opinion mining. Tiernan [10] reviewed and discussed methodological points when designing lectures incorporating Twitter. Wankel [11] gives an overview of the use of the main social media platforms (Facebook, blogs, YouTube, Twitter, MySpace, and Second Life) in teaching. Ebner et al. [12] experimentally investigated the use of the microblogging platforms MBlog and MediaWiki within classrooms. Arceneaux & Weiss [13] analyzed the press coverage and public responses to Twitter technology from 2006 through the first months of 2009. Richter & Schäfermeyer [14] presented a very small overview of case studies on social media marketing (four were related to Twitter). A current state-of-the-art review of overlapping domains of geographic-related sensor techniques (Sensor Web, citizen sensing and 'human-in-the-loop sensing', etc.), and the roles of these domains in environmental and public health surveillance and crisis/disaster informatics can be found in [15]. Dredze [16] offered a very short overview of several studies concerning health-related tweet-content including his own recent work. Micieli & Micieli [17] reviewed ophthalmology related peer-reviewed literature for Twitter content. Smith and Lambert [18] presented a very small review of healthcare education. Williams et al. [19] provided a documentation-oriented overview. Zimmer and Proferes [20] reviewed Twitter research concerning disciplines and methods. Last but not least, danah m. boyd published a bibliography (http://www.danah.org/researchBibs/twitter.php) of research on Twitter and microblogging. However, a comprehensive review concerning the utilization of Twitter within socio-political revolution processes is still open.

4. Kuran’s theory of unanticipated political revolution

Kuran [2] has analyzed several political revolutions (e.g., France 1789, Russia 1905/1917, Iran 1978/79)
and found a typical pattern of revolutionary stages (see figure 1).

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<tr>
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<td>guiding, suggesting, and threatening activities</td>
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<td>VI. Post-revolution phase</td>
<td>repression of would-be turncoats</td>
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Figure 1: Kuran’s six stages of revolution; in accordance to [2].

According to Kuran’s theory, for a revolution to start the majority of a population will be discontented with their living conditions but suppress these feelings and preferences. Over time some individuals feel such a inner tension that “a relatively minor event makes a few individuals reach their boiling point and take to the streets in protest. This kicks off the latent revolutionary bandwagon, and the opposition darts into power. The magnitude and speed of the revolutionary process come as an enormous surprise, precisely because the masses had been concealing their growing frustrations” [2, p. 60]. A very crucial point for a successful revolution is the emergence of suitable leader(s) from the mass and the repression of would-be turncoats.

5. Twitter usage during revolutions

Our review spans a wide range of initiated attempts at socio-political revolution: 2007 Wikileaks (#Wikileaks, [21]), 2009 Moldova (#pman, [22]), 2009 Austria student protest (#uni, #wien, #socialrevolution, [23]), 2009 Israel-Gaza [24]–[27], 2009 Iran green revolution [28], 2010 Venezuela (#SOSInternetVE, [29]), 2010 Germany Stuttgart21 (#s21, [30]), 2009 Toronto G20 (#G20, #g20report, [31]–[33]), 2011 Egypt (#jan25, #egypt, #Tahrir, [1,34]–[42]), 2011 England (#Riots, #RiotsCleanup, #WitnessAppeal, [37, 43]–[45]), 2011 US Occupy movement (#occupythe-world, #OccupyWallStreet, #ows, [38,46]–[53]), 2011 Spain Indignados (#notenemosmiedo, #nolesvotes, #15m, #spanishrevolution, [38,46]–[51,54]), 2011 Greece Aganaktismenoi movements (#greekrevolution, #ayfagakalk, [51]), 2011 Italy (#15ott, #15oct, #15o, [55]), 2011 Wisconsin labor protest (#wiunion, [56]), 2012 Israel Hamas (IDFSpokesperson, [57]), 2013 Brazil Vinegar (#vemprarua, #todarevolucaocomeca, [46]), 2013 Turkey (#OccupyGezi, [58]) in different stages and with varied success (figure 2).

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<th>Stages of revolution (Kuran 1989)</th>
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2007 Wikileaks
2009 Austria student protest
2009 Toronto G20
2010 Venezuela
2010 Germany Stuttgart21
2008/2009 Israel-Gaza
2009 Iran green revolution
2009 Moldova
2011 Egypt
2012 Israel Hamas
2013 Brazil Vinegar
2011 England
2011 US Occupy movement
2011 Spain Indignados
2011 Greece Aganaktismenoi
2011 Italy
2011 Wisconsin labor protest
2013 Turkey

Figure 2: Investigated revolutions; stages in accordance to [2].

5.1. Twitter usage during revolutions from the perspective of Kuran’s theory

It was found that most of the literature is related to stages II to V. The reason for that is the fact that Twitter is mainly used in these stages. For instance, Lysenko and Desouza [22] investigated the role of social networking sites in Moldova’s Revolution of April 2009 and found that Twitter was mostly used during the later phases of the revolution within the active street protests and the subsequent information war and for communication about the conflict.

5.1.1. Discontent of the mass (I). There are no specific Twitter revolution studies focusing on stage I. However, a large body of literature concerning sentiment analysis exists, e.g. [4,59]–[62]. For instance,
Jamal et al. [39] analyzed Twitter discourses and proposed a method to detect subtle sentiment within the mass (e.g. anti-Americanism). That is why we formulate the following design need:

\[ D_1: \text{There is a design need for sophisticated sentiment detection in order to extend Twitter functionality for socio-political revolution purposes.} \]

5.1.2. Inner tension of the individual (II.). There are more studies focusing on stage II. Passini [63] discussed the so-called Twitter revolutions in the light of social psychology theories, especially the tensional relationship between disobedience and democracy. It is known from psychology that high inner tension is associated with joking [64,65]. Interestingly, some scholars report increased (curious) joking rates on Twitter associated with the high inner tension of individuals. For instance: “Deleting Dictator...Deleting Installation files...Some files could not be removed. Country still being used...Aborted. #Egypt #Mubarak” [41, p. 277]. Choudhary et al. [36] also show that during the 2011 Egypt protests humor was often used.

In addition some scholars proposed methods to automatically analyze inner tensions. For instance, Burnap et al. [66] demonstrated the possibility of forecasting spikes in social tension via Twitter. Thorpe and Ahmad [26] revealed indications of inner tension in some individuals from a grassroots parkour group living in Gaza.

At the end of stage II a specific trigger event constitutes the straw that breaks the camel’s back.

5.1.3. Trigger event (III.). Kuran [2] found that in every revolution of historical significance a trigger event occurred. This trigger event was also found in more recent revolution (attempts) [67]. For instance, within the Gaza conflict the Israeli Air Force (IAF) began a massive bombardment of Hamas targets in the Gaza Strip on December 27, 2008, at approximately 11:30 a.m. (Israeli time) [27]. The 2011 Wisconsin labor protests were triggered by the announcement on February 11, 2011 of Governor Scott Walker’s intention to strip about 175,000 public employees of their collective bargaining rights [56]. Procter et al. [44] described the phenomenon during the 2011 riots in England as follows: “A rumour starts with someone tweeting about the occurrence of an alleged incident. The rumour gets retweeted... Others begin to challenge its credibility... A consensus begins to emerge...” [44, p. 207]. The touchstone if a mass movement emerges is based on the credibility of the alleged incident and the consensus about its socio-political relevance. When it turns out that the alleged incident did not occur or reporting about it has been partially manipulated (e.g. faked images of the burning London Eye during the 2011 riots [44], cf. [68]) the motivation of the masses recedes and the movement ends. Gleason [48] demonstrated by the example of the 2011 Occupy Wall Street protests that “Twitter supports multiple opportunities for participation in the Occupy movement – from creating, tagging, and sharing content to reading, watching, and following a hashtag – which may facilitate learners becoming more informed, engaged citizens” [p. 966] [48]. Park et al. [49] revealed a “loosely connected hub-and-spoke network” of the 2011 Occupy Wall Street activists. Wang et al. [69] also analyzed the 2011 Occupy Wall Street protests and found that the arguments of those who initiated it were very unstable which indicates a low credibility. As a consequence a counterpublic emerged [50]. Similar weak and inconsistent arguments were observed during the 2010 Toronto G20 protests, resulting in an open criticism of the protests [32,33]. Earl et al. [31] analyzed the 2009 Pittsburgh G20 movement and found that Twitter created “a new dynamic in protester and police interaction toward information symmetries” [31, p. 459]. Also the 2011 Spanish protests dissipated for the same reasons [51]. Against this background we formulate:

\[ P_1: \text{High credibility of an alleged incident is a precondition for starting a mass movement.} \]

In addition to the high credibility of the incident its socio-political relevance has to be high in order to mobilize the masses. Various examples show revolution imitators trying to trigger a protest by copying arguments. For example, González-Bailón [38] identified the 2011 Spanish wave of protests as “a step in the sequence of events that went from the Arab Spring in the MENA region at the beginning of 2011 to the global Occupy movement” [38, p. 950]. That is why in
the case of the 2011 Spanish protests the movement also fails. The same was observed by Vicari [55] for the 2011 Italy polycentric protest for global change. We formulate:

\[ P_2: \text{High socio-political relevance of an alleged incident is a precondition for starting a mass movement.} \]

5.1.4. (Unanticipated) revolution (IV). Tweets like “#Egypt’s street awakening tomorrow #Jan25 #Revolution” [41, p. 277] or “Egypt is about to have a Facebook revolution” [41, p. 277] reopen and drive the unanticipated revolution. In this stage, the high speed of connecting people via Twitter drives the revolution. For example, Maireder and Schwarzenegger [23] analyzed the #unibrennt hashtagged tweets of the occupation of Vienna’s largest lecture hall by students in October 2009. The grounded theory-based analysis [70] revealed that the low-obligatory and low-binding nature of Twitter use, and the immediacy of connection between the movement members were fundamental for its success.

Later, when the mainstream media began reporting the protests attained greater visibility. The greater visibility and ongoing internet functionality is important to move the masses. Unfortunately some regimes shut down internet access or manipulate its content [57,71]. However, the visibility of the activists is important in order to draw support from various actors. For instance, Bruns et al. [35] demonstrated supportive interactions concerning protests and unrest in countries from Tunisia to Syria during 2011 Arab Spring. Severo and Zuolo [42] showed that the 2011 Arab Spring was also supported by Egyptian migrants living in Europe (# right2vote). Tonkin et al. [45] investigated 600,000 tweets concerning the riots in London and other British cities in August 2011 and found evidence that Twitter was used as a central organizational tool to promote illegal group action. Results also showed that Twitter users retweeted mostly to demonstrate support for their beliefs in others’ comments. Jungherr and Jürgens [30] showed that during the 2010 German Stuttgart 21 movement Twitter was largely used for tactical support. It is also interesting that successful mass movements are characterized by their success in getting support from people not directly affected by the revolution. For instance, Aday et al. [34] revealed that the majority of attention to the Arab Spring via Twitter came from outside the Middle East and North Africa (MENA) regions.

5.1.5. Revolutionary leadership (V). It is crucial for the success of a revolution that the masses are coordinated by (a hierarchy of) leaders. That is why within this stage, tweets become more personal and emotive [41]. Not only do tweets become more personal and emotive [41] during this stage, but an interesting recent Twitter experiment by Coppock et al. [72] revealed that private messages to followers have the most effect in terms of mobilizing people. In contrast, public tweets had no effect. This direct approach is particularly important since leadership via Twitter means leading from a (physical) distance.

In addition, information selection plays an important role. For instance, Oh et al. [25] analyzed Twitter data on the Israel-Gaza conflict between December 27th 2008 to January 18th 2009. According to Oh et al. [25], “Twitter users are conceptualized as the ‘gated’ who play an active role in selecting and distributing news sources through their Twitter messages” [25, p. 1]. The concept of gatekeeping for information control was introduced by Barzilai-Nahon [73]–[75] and also plays an important role in terms of leadership during revolutions by information selection. For instance, Meraz and Papacharissi [40] places emphasis on news framing and its relevance to sociocultural context in order to lead the masses during the 2011 Egypt revolution.

As described above in this stage it is crucial for a successful revolution that suitable leader(s) from the mass can be identified [2]. Some scholars proposed approaches for this. For instance, Kardara et al. [76] proposed a framework to identify leaders within a Twitter group. Räbiger and Spiliopoulou [77] demonstrated an approach to separate the influencers from the non-influencers and Part [78] found that Twitter opinion leadership impacts an individuals’ involvement in political processes.

Since all the above reported specific findings on Twitter-based leadership are well-known from the perspective of the problem of general leadership from a distance, which is well documented in the human resources literature [79,80], we consequently formulate:

\[ P_3: \text{Twitter-based leadership during a revolution does not significantly differ from general leadership from a distance.} \]

In addition, various scholars focused on visionary leaders within successful revolutions [21,81]. For example, Lindgren and Lundström [21] analyzed Twitter activity under the #WikiLeaks hashtag and found that movements have a common language, agreed definitions of the situation and a shared vision. We formulate:

\[ P_4: \text{Transformational leadership style is positively associated with the success of a revolution.} \]

Furthermore, within the revolutionary leadership
The analysis-synthesis concept [86] comprises (a) the decomposition of the main task (goal) into sub-tasks delegable to people and (b) the synthesis of sub-tasks results in order to reach the superior goal. For example: The complex task of playing a music title has to be broken down into sub-tasks such as playing specific musical instruments by musicians (analysis part). The conductor is responsible for the orchestration of the musicians (synthesis part).

5.1.6. Post-revolution phase (VI.). In this stage the repression of would-be turncoats initiated due to new rumors is important. Please note that Doer et al. [37] found that rumors spread much more quickly in Twitter than in other network topologies. It only needs the interaction of a few nodes to increase the speed. That is why rumor-spreading detection and prevention systems are needed. Scholars initially sketched such systems, e.g., Tripathy et al. [87] studied models and metrics for anti-rumor processes to counter rumor on Twitter. Miyabe et al. [88] demonstrated an approach to prevent rumor-spreading on Twitter. However, in order to detect rumor more reliably at an early stage we recommend combining existing work on trend identification [89]–[95] and geo-located [96] event detection [97]–[100] and formulate the following design need:

D₃: There is a design need for sophisticated rumor detection in order to extend Twitter functionality for socio-political revolution purposes.

Finally it should be noted that some scholars revealed scepticism concerning the role of Twitter within socio-political revolutions. For instance, the Iran specific findings of Wojcieszak and Smith [28] support voices that are skeptical about Twitter’s ability to sustain revolution [101].

6. Framework guiding future research

As shown in figure 3, the framework guiding future Twitter research spans both, (a) the coordination, sentiment and rumor analysis problems as the primary technological-/design-oriented challenges and (b) five propositions from P₁ to P₅ to direct future empirical research:

As the coordination problem refers to the management of “dependencies between activities” [83, p. 90], this concept comprises the recruiting [102] and the leadership of the whole crowd [103] by signaling, skills, rating, hierarchies, and markets [104,105] on the basis of technical coordination mechanisms such as automated negotiation and auction systems [106,107].
I. Discontent of the mass
II. Inner tension of the individual
III. Trigger event
IV. (Unanticipated) Revolution
V. Revolutionary Leadership
VI. Post-revolution phase

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<th>Sentiment detection</th>
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Figure 3: A framework guiding future Twitter research from a socio-political revolution perspective.

7. Conclusion, Limitations, Future Work

Following the research call of [1] we reviewed all the existing “substantial” scientific work concerning the online social network Twitter included in top peer-reviewed journals and conferences related to the socio-political revolution perspective and built up a comprehensive literature review. The review was structured following Kuran’s theory [2] of (unanticipated) political revolution and serves to stimulate future research by proposing five propositions and three technological design needs.

Because the analysis was restricted to peer-reviewed publications with completed research work, a few publications containing interesting material were potentially excluded from this review. This excluded material could contain negative or non-confirmatory (test) results, potentially resulting in publication bias. Besides, within our work we combined different types of social unrest, movements and revolutions (see figure 2) in order to generalize the pattern of socio-political revolution as far as possible. However, future work could differentiate these different types.

Furthermore, future work should systematically evaluate the five propositions P1 to P5 and the design needs D1 to D3. In addition, future work using alternative frameworks (e.g. by Tilly & Tarrow [108] or Bennett & Segerberg [109]) for analyzing the body of Twitter literature may be very useful.

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