

The Arab Spring**The Role of ICTs**

WikiRevolutions: Wikipedia as a Lens for Studying the Real-time Formation of Collective Memories of Revolutions

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In this article, we propose to interpret the online encyclopedia Wikipedia as an online setting in which collective memories about controversial and traumatic events are built in a collaborative way. We present the richness of data available on the phenomenon, providing examples of users' participation in the creation of articles related to the 2011 Egyptian revolution. Finally, we propose possible research directions for the empirical study of collective memory formation of traumatic and controversial events in large populations as they unfold over time.

Introduction

On December 17, 2010, Mohammed Bouazizi, a 26-year-old fruit vendor in the central town of Sidi Bouzid doused himself and set himself on fire in front of a local municipal office. On January 25, 2011, a series of protests began in downtown Cairo and across the country against the government of Egyptian President Hosni Mubarak, in what has been called the "Day of Revolt." In the following days, protests spread across Tunisia and Egypt, leading to the flight of the Tunisian president Zine El Abidine Ben Ali from his country on January 14, 2011, and to the resignation of Hosni Mubarak on February 11, 2011. Besides the great deal of media attention received by these events, the Tunisian and Egyptian revolutions also triggered an intense flurry of editing activity and heated discussions on the online encyclopedia Wikipedia.

Events like the Tunisian and Egyptian protests, which involve entire populations and lead to social change, are inherently controversial and traumatic, and they leave indelible marks on the social and cultural tissue. Sztompka (2000) outlined a number of characteristics which should identify traumatogenic social change. First, it should be sudden, and the related events should happen in a relatively short lapse of time: The Tunisian and Egyptian revolutions led to the disposition of their leaders in 25 and 17 days, respectively. Second, traumatogenic change should be wide and comprehensive, affecting different aspects of social and personal life and involving many actors. Again, the protests that spread across Tunisia and Egypt were nationwide, touching not only the political arena, but also art, law, and economic,

cultural and moral domains. Third, traumatogenic social change involves the deep core of the society, being radical and fundamental. In the case of the recent North African revolutions, the overturning of the power hierarchies determined a radical and profound change in the constitution of Tunisian and Egyptian societies, involving entire populations.

These kinds of social changes can often lead to cultural trauma in the populations that experience the traumatizing events. In fact, cultural trauma is deeply connected with the collective identity and the construction of the collective memory. It becomes evident when the members of a collectivity are left with indelible marks on their consciousness and memories, which inevitably need to be reshaped in the light of the new societal changes (Alexander, 2004; Eyerman, 2004).

Collective memory can also play a therapeutic function for the community members, who actively participate in a sense-making process, interpreting and elaborating the past through the creation of different narratives and other memory representations. Furthermore, the negotiation of a crystallized shared experience allows the community to symbolize the trauma, providing opportunities for coping and healing (Wang, 2008; Zerubavel, 1995).

In this paper, we intend collective memory as a continuous, active process of sense-making and negotiation between past and present (Olick & Levy, 1997). Collective memory has been investigated from several different perspectives. For example, psychological research has largely studied collaborative recall in small groups (Barnier, Sutton, Harris, & Wilson, 2007; Barnier & Sutton, 2008; Cuc, Ozuru, Manier, & Hirst, 2006; Ekeocha & Brennan, 2008; Weldon & Bellinger, 1997) and flashbulb memories (Brown & Kulik, 1977; Conway, 1995; Winograd & Neisser, 1992), while sociological, philosophical, and historical investigations have considered the collective from a broader perspective, as a nation or a culture (Harris, Paterson, & Kemp, 2008).

Nevertheless, empirical research is still needed in order to integrate and validate existing theories on collective memory building on a large scale. In this regard, the pervasiveness and the rapid expansion of the Internet and Web 2.0 services provide unprecedented opportunities for social scientists. Indeed, new digital media allow new forms of communication and participation on a global scale, and researchers can now access, unobtrusively and almost in real time, large amounts of data related to people's thoughts and communicative interactions (Castells, 2001; Cohn, Mehl, & Pennebaker, 2004). In fact, Web 2.0 and social networking sites (boyd & Ellison, 2008) allow people to produce content as they consume it. For example, it is possible to share personal feelings and thoughts on Facebook or Twitter, upload videos and photographs on YouTube and Flickr, and also write the representation of public events on Wikipedia.

Wikipedia is an online encyclopedia collaboratively written by millions of people. Indeed, its pages—see, for example, the article on the "2011 Egyptian revolution" (Wikipedia.org, 2011a) in Figure 1—can be directly created and modified on the website by anyone.



The screenshot shows the Wikipedia article page for the 2011 Egyptian revolution. The page title is "2011 Egyptian revolution". The main content discusses the revolution's causes, progression, and outcomes. A sidebar on the left contains links to other Wikipedia pages and sections like "Toolbox" and "Languages". On the right, there is a summary box with a photo of protesters in Tahrir Square and key facts about the revolution.

2011 Egyptian Revolution	
Demonstrators in Cairo's Tahrir Square on 8 February 2011	
Location	Egypt
Date	since 25 January 2011; unrest ongoing
Characteristics	civil disobedience, civil resistance, demonstrations, riots, strike actions
Death(s)	at least 384 ^{[1][2]} including at

Figure 1. Screenshot of the main article about the 2011 Egyptian revolution (Wikipedia.org, 2011a).

Every Wikipedia article is associated with a talk page, which commonly serves as a forum for users to discuss the article content and suggest possible changes (see Figure 2).

Mubarak's presidency section

[\[edit\]](#)

In the wake of Mr. Sadat's death, Mr. Mubarak continued a policy of maintaining ties with Israel, and cracked down on Islamic militants. His support for Israel won him the support of the West and a continuation of hefty annual aid from the United States. The crackdown on the Islamic Brotherhood forced the militants underground

That was taking from NY times article. so please stop editing that same line over and over again. thank you -- [The Egyptian Liberal](#) (talk) 03:03, 27 January 2011 (UTC)

Emergency Law

[\[edit\]](#)

The part of the emergency law is not updated with the new amendment of the People's Assembly in 2010, please review. —Preceding [unsigned](#) comment added by [41.237.205.159](#) (talk) 09:45, 26 January 2011 (UTC)

Is this an acceptable manipulation of tone for a definition of the law? "Under that 'state of emergency', the government has the right to imprison individuals for any period of time, and for virtually no reason, thus keeping them in prisons without trials for any period" —Preceding [unsigned](#) comment added by [98.235.115.82](#) (talk) 21:44, 28 January 2011 (UTC)

Corruption paragraphs removed

[\[edit\]](#)

I removed the following paragraphs:

While in office, political corruption in the Mubarak administration's Ministry of Interior has risen dramatically, due to the increased power over the institutional system that is necessary to secure the prolonged presidency. Such corruption has led to the frequent imprisonment of political figures and young activists without trials, illegal undocumented hidden detention facilities, and rejecting universities, mosques, newspapers staff members based on political inclination. [\[citation needed\]](#) On a personnel level, each individual officer can and will violate citizens' privacy in his area, using unconditioned arrests, common torture and abuse of power, depending on simply brute force, rather than law, to enforce order in the officer's designated area. [\[citation needed\]](#)

The rise to power of powerful business men in the [NDP](#) in the government and People's Assembly led to massive waves of anger during the years of Prime Ministers [Ahmed Nazif](#)'s government. As a result, frequent laws and bills are passed, with undergiant monopolists (such as [Ahmed Ezz](#)'s monopolizing the

Figure 2. Screenshot of discussions on the talk page of the article about the 2011 Egyptian revolution (Wikipedia.org, 2011b).

In Wikipedia, every contribution to every article or talk page is recorded, along with the identity of the contributor, the performed changes in text, and the timestamp (see Figure 3). Thanks to this information, it is possible to keep track of the entire edit history of the pages.



The screenshot shows the Wikipedia revision history page for the article "2011 Egyptian revolution". The page includes the Wikipedia logo and navigation links like Article, Discussion, Read, Edit, View history, and Search. The main content area displays a list of recent edits with details such as date, time, user, and edit summary. A sidebar on the left provides links to Main page, Contents, Featured content, Current events, Random article, and various interaction tools.

Date	User	Edit Summary
22.05. 25 January 2011	The Egyptian Liberal	The Egyptian Liberal (talk contribs) (12,692 bytes) (\rightarrow Scale of protests) (undo)
21:59, 25 January 2011	Dragons flight	Dragons flight (talk contribs) (12,375 bytes) (\rightarrow Scale of protests: move ref to end. add citation needed on first part, no mention of 15000 or Tahrir square in the cited article.) (undo)
21:56, 25 January 2011	Sopher99	Sopher99 (talk contribs) (12,397 bytes) (\rightarrow Background: capitalization) (undo)
21:55, 25 January 2011	Sopher99	Sopher99 (talk contribs) (12,397 bytes) (\rightarrow Background: spelling and grammar errors) (undo)
21:53, 25 January 2011	Heroeswithmetaphors	Heroeswithmetaphors (talk contribs) (12,393 bytes) (ref: <i>The New York Times</i>) (undo)
21:52, 25 January 2011	The Egyptian Liberal	The Egyptian Liberal (talk contribs) m (12,015 bytes) (\rightarrow Background) (undo)
21:47, 25 January 2011	The Egyptian Liberal	The Egyptian Liberal (talk contribs) m (12,005 bytes) (undo)
21:42, 25 January 2011	The Egyptian Liberal	The Egyptian Liberal (talk contribs) m (11,785 bytes) (undo)

Figure 3. Screenshot of the revision history of the article on the 2011 Egyptian revolution (Wikipedia.org, 2011c).

In the context of communication technologies and their relationships with the events occurring in the North African regions, the online encyclopedia Wikipedia can be considered to lie in the middle way between the top-down information provided by traditional news agencies and the bottom-up individual thoughts and accounts expressed by users of new media and social networking sites. In fact, Wikipedia policies demand that every article is based on reliable and published secondary sources and not on first-hand evidence. Moreover, Wikipedia content is intended to be edited collaboratively, and to express a neutral point of view (NPOV; see Wikipedia.org, 2011d). Indeed, according to Wikipedia policies, "editing from a neutral point of view (NPOV) means representing fairly, proportionately, and as far as possible without bias, all significant views that have been published by reliable sources." Therefore, in order to establish neutrality and verifiability, consensus is the primary way in which editorial decisions are taken. For example, the article about the "2011 Egyptian revolution" (Figure 1) is the ongoing description of the related happenings, and it is, in fact, the result of the negotiation between different narrations and of the thousands of small edits by hundreds of different people (Figure 3), which concur to build this unique collective creation.

In this article, we follow Pentzold's (2009) interpretation of Wikipedia as a global memory place (Nora, 1996), where memories about events are discussed through the negotiation of different points of view. Specifically, the actions performed by users, both direct edits to the articles and discussions on the related talk pages, can be interpreted as part of the discursive formation of memory, which is reached through the gradual passage from communicative to cultural memory (Assmann, 1995). While

communicative memory is informal, interactive, disorganized, unstable, and expressed through communication between individuals in everyday life, cultural memory is "supra-individual," long lasting, well-organized, formal, and objective (*ibid.*).

The possibility to access the entire edit history of every Wikipedia page provides researchers with the unique opportunity to study the progressive formation of collective memories and the transition from communicative to cultural memory in ways that overcome some of the methodological challenges faced by the study of traumatic and controversial events. Indeed, while traditional research on collective upheavals has broadly relied upon retrospective self reports, the widespread diffusion of new digital media allows researchers to directly access and record people's thoughts and feelings (Cohn et al., 2004). The natural ongoing experience, loaded with the emotional involvement of users of Web 2.0 services, is provided almost in real time, allowing researchers to unobtrusively study the evolution of the emotional impact of traumatizing events from their very beginning.

In the next section, we show evidence that the 2011 North African revolutions triggered a time of heavy and abrupt participation on Wikipedia, which we interpret as the beginning of collective memory building processes. In the last section, we provide directions on how this vast amount of empirical data can be exploited for research purposes.

Evidence of Collective Memories Processes about North African Revolutions in Wikipedia

The Egyptian revolution triggered an intense amount of participation in Wikipedia, beginning with the very first days of protests. The article "2011 Egyptian revolution" (Wikipedia.org, 2011a) on the English Wikipedia was created on January 25, 2011 at 13:26 (GMT), the same day the protests started. In the course of the first 45 days (January 25–March 10, 2011¹), it received 6,059 edits by 1,190 different users, with an average of 135 edits each day. The related talk page (Wikipedia.org, 2011b) received 2,741 edits by 282 different users, with an average of 61 edits per day (Toolserver.org).

The articles about the main events related to the 2011 Egyptian revolution were promptly organized by Wikipedia users in a category, called "Egyptian Revolution of 2011" (Wikipedia.org, 2011e), containing 21 pages, such as "Domestic responses to the Egyptian Revolution of 2011," "Timeline of the 2011 Egyptian revolution," or "April 6 Youth Movement." This category also comprises another subcategory, named "People of the 2011 Egyptian Revolution," which consists of 36 pages.

Moreover, the access logs of Wikipedia show that the "2011 Egyptian revolution" article was accessed at least 900,000 times in the course of February 2011 (Stats.grok.se). This confirms the widespread popularity of Wikipedia, which is consulted by a large share of people who form their views and interpretation of current controversial events as they occur at least partially by considering information provided by Wikipedia articles. However, even if the "passive" act of reading a Wikipedia article has been suggested as a valuable form of participation (Antin & Chesire, 2010), in the framework of collective memory formation, we are more interested in the "active" act of participating through making

¹ Wikipedia is an ongoing project and continuously changes, so the empirical data we provide in this section have limited validity in time and become obsolete very soon. Therefore, the data provided, retrieved between March and April 2011, should be considered to get a general awareness of the richness of the phenomena described.

edits to the article pages or associated talk pages.

In fact, in Wikipedia, every contribution to every article or talk page is recorded, and this allows one to keep track of the entire edit history of the pages. We believe that the possibility to empirically analyze, in real time, this considerable amount of activity related to the construction of collective memory by Wikipedia users is an exceptional opportunity for research. Furthermore, this noticeable amount of participation is not limited to the English Wikipedia: The article “2011 Egyptian revolution” links to 49 related articles on Wikipedias in 49 different languages (Figure 4).

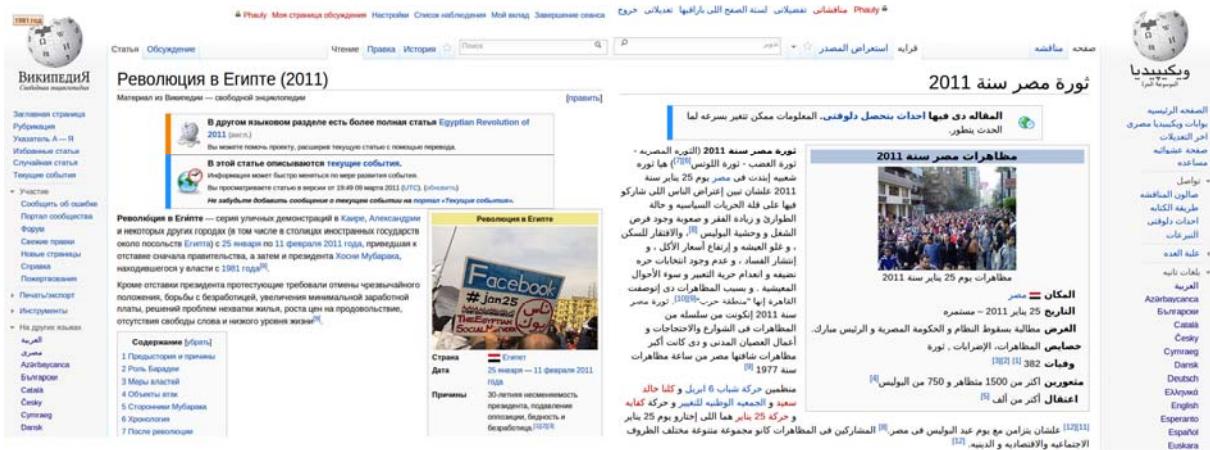


Figure 4. Screenshot of “2011 Egyptian Revolution” articles on Russian (Wikipedia.org, 2011f) and Arabic Wikipedias (Wikipedia.org, 2011g).

Table 1 reports the number of edits to the articles and talk pages related to the Egyptian revolution for the most active Wikipedias.

Table 1. Number of edits to articles related to the 2011 Egyptian revolution on the most edited Wikipedias (as of March 10, 2011).

Language of Wikipedia	URL	Number of edits	Number of registered users
English	en.wikipedia.org	6,059	14,163,711
Arabic	ar.wikipedia.org	1,269	361,575
German	de.wikipedia.org	961	1,188,936
French	fr.wikipedia.org	937	1,020,133
Russian	ru.wikipedia.org	575	638,040
Azerbaijani	az.wikipedia.org	528	27,496
Turkish	tr.wikipedia.org	496	333,207
Spanish	es.wikipedia.org	490	1,761,811
Arabic-Egyptian	arz.wikipedia.org	445	16,833
Italian	it.wikipedia.org	440	611,936
Farsi	fa.wikipedia.org	406	213,835

We have already commented that, on the English Wikipedia, which is the most active in the project, the main article received a substantial amount of edits during the first 45 days. However, it is interesting to note that, given the centrality of the issue for the region, the corresponding articles have also been considerably edited on Wikipedias that are not among the most active ones, such as Azerbaijani, Turkish, and even Arabic-Egyptian, with 528, 496, and 445 edits, respectively.

In Table 2, we report more detailed statistics for the articles and associated talk pages related to the 2011 Egyptian revolution in the most active Wikipedias. Some of the data provided in this contribution were derived from different tools that process the information about the activity registered in Wikipedia (Article info, Wikirage, Wikipedia statistics, Wikichanges). Other data, especially those related to the evolution of edit activity on pages about traumatic events, were collected implementing open source scripts² developed to process the XML files provided by the Wikimedia Foundation, which contain the revision history of all pages of Wikipedia (Ferron & Massa, 2011).

Data provided in Table 2 allow to appreciate the timeliness with which the articles and talk pages were created after the 2011 Egyptian revolution: in the case of the English and Arabic Wikipedias the article was created the very same day, actually during the arising of the protests in the streets.

² The scripts for parsing the Wikipedia revision history are released as open source at <http://github.com/phauly/wiki-network/>

Table 2. Statistics on the “2011 Egyptian revolution” Wikipedia page, as of 3/10/11 (Article info).

	English	English Talk	Arabic	Arabic Talk	German	German Talk	Egyptian Arabic	Egyptian Arabic Talk
Creation date	Jan. 25, 2011, 13:26:38 (by The Egyptian Liberal)	Jan. 25, 2011, 13:26:47 (by The Egyptian Liberal)	Jan. 25, 2011, 16:55:38 (by عمر و عمر)	Jan. 25, 2011, 20:35:11 (by Jo NaHaL)	Jan. 26, 2011, 10:53:04 (by 195.145.91.170)	Jan. 26, 2011, 11:24:41 (by Generator)	Jan. 28, 2011, 01:52:19 (by Ghaly)	Feb. 5, 2011, 18:01:04 (by Faris knight)
# edits	6,059	2,741	1,269	99	961	315	448	8
Avg # edits per day	134.6	60.9	28.2	2.2	21.4	7.0	10.0	0.2
# editors	1190	282	236	24	264	79	35	5
# of edits by top 10% of active users	4,406 (72.80%)	2,193 (80.01%)	895 (70.53%)	42 (42.42%)	572 (59.52%)	166 (52.70%)	347 (77.46%)	2 (25.00%)
Most active editors	Egyptian Liberal	559	Lihaas	375	Ahmed m rabea	185	Egyptian Liberal	18
	Lihaas	486	Egyptian Liberal	332	خلدون شنتوت	174	Osa osa 5	14
	Lihaas	275	Ocaasi	314	Moh2010med	143	Mohamed Ouda(c)	10
	94.246.150.68	196	94.246.150.68	263	WikitanvirBot	64	62.220.33.64	9
	108.14.100.42	187	Silver seren	144	Osa osa 5	43	Moh2010med	8
	Wipsenade	168	Wipsenade	118	Mohamed ElGedawy	29	خلدون شنتوت	7
	Ericoides	167	Knowledgeki d87	75	Egyptian Liberal	27	أسامة عباس	5
	Aude	143	Cs32en	69	Luckas-bot	24	غلام الأسلم	5
Anonymous # edits	1,336 (22.08%)	426 (15.54%)	202 (15.92%)	11 (11.11%)	148 (15.40%)	73 (23.17%)	29 (6.47%)	0 (0.00%)

For all the reported Wikipedias, the number of edits per day clearly highlights heavy activity, especially in the English Wikipedia, with an average of 135 edits per day.

Table 2 also reports the number of different editors involved in the process of contributing to the collective memory building. In particular, we detected a high participation on the English, Arabic, German, and Egyptian-Arabic Wikipedias. The number of edits made by the top 10% of active users suggests that, although some editors are more involved than others in the article, in general, the participation seems to be rather equally distributed among participants. To this point, it is relevant to note that Wikipedia policies point out that contributions are open to anyone, and therefore users should not consider themselves as the owners of a page.

Considering the "2011 Egyptian revolution" article, one of the most prolific editors was a user nicknamed "The Egyptian Liberal" (Table 2), who created the English version of the article on January 25, 2011. According to his userpage (Wikipedia.org, 2011h), he is a native speaker of both Arabic and English, is irreligious and "an advocate of democracy." He supports the independence of Palestine and states that "there are 2000000 reasons why the 2003 invasion of Iraq was wrong." Table 2 shows that "The Egyptian Liberal" was one of the most active editors in the Arabic and Egyptian-Arabic Wikipedias, especially in the talk pages associated with the articles about the 2011 Egyptian revolution. His assiduous participation in the talk pages in different languages suggests a strong engagement, both in the discussions on the revolution, and in the negotiation of perspectives that take place in Wikipedia. Besides "The Egyptian Liberal," there seems to not be much overlap among the most prolific editors in the different Wikipedias, suggesting that distinct communities might develop different versions of the Egyptian revolution. This opens the way to cross-cultural research on the construction of different collective memories about the recent controversial events.

As already mentioned, the process of collective memory building is the result of a complex ecology of discussions on different perspectives. The excerpt reported below gives an idea of such negotiations of different interpretations between users. The discussion took place during the second day of protests on the talk page of "2011 Egyptian revolution" in the English Wikipedia. In the example, the first user challenges the neutrality of the current description and an anonymous user replies accusing him to be a "defender of the regime."

This article is not taking a neutral stance. I believe it is forged by anti-regime contributors who are taking the side of the protesters by any means available. I'm neither contributing nor will I contribute to the article, but for those who are doing so, have some Wikipedian ethics. Thank you. [[User:MagedMahfouz|Maged Mahfouz]] ([[User talk:MagedMahfouz|talk]]) 16:33, 26 January 2011 (UTC)

Well like it or not Maged, when a people rise up and overthrow a despotic regime, the facts of the matter are what they are. One is not anti-fascist by reporting on the Third Reich or the Italian New Order. Nor is there any "forgery." Your input as a defender of the regime will definitely help the article be a better report of the objective facts, but on the basis of the evidence and assuming no one is ready to provide such support, I suggest the NPOV tag be removed.

*[Special:Contributions/72.228.177.92/72.228.177.92] ([User talk:72.228.177.92/talk])
19:06, 26 January 2011 (UTC)*

The negotiation of different perspectives and points of view can also serve a therapeutic function, helping the community to elaborate the painful experience through the creation of different memory representations. As Wang argues, the "constructive and transcendent nature of collective memory allows the community and its members to make sense of the past and further create a shared story by symbolizing the trauma, thus providing opportunities for transforming the pain they experienced and for further healing" (2008, p. 309). The following excerpt from the talk page of "2011 Egyptian revolution" in the English Wikipedia suggests how users tried to interpret the "sacrificial death" of men and women, crystallizing it into a shared narrative to be published on the related article, even through the symbolization of the traumatic experience. In particular, the discussion focuses on the stories of Sally Zahran, killed during the demonstrations, and of Khaled Said, whose death contributed to inspiring the protests.

Anyone have a picture of a man who died to be placed in the Death section of the article as well?

The justification (re: Purpose of use) for the addition of the image of the woman there now is to "illustrate the participation by and the central role of women in the demonstrations." But ironically the presence of only a female who died effectively makes the numerous sacrificial deaths of men -- of which there were many more, btw -- pictorially invisible. Does no one have even one picture of a man who sacrificed his life for this? Considering that many men did it would likely be most appropriate, and it would also balance the currently female only representation of this matter. Alaliac (talk) 14:26, 22 March 2011 (UTC)

Give me one of their names and I will see what I can do. The reason I added Sally was because NASA reportedly plans to name one of its Mars exploration spacecraft in Zahran's honor. I also added a picture of a nameless victim here if you want to add him.— The Egyptian Liberal (talk) 05:58, 23 March 2011 (UTC)

Alright, I'll try to find some names for you. And wow, NASA plans to name a spacecraft after Zahran? Just curious, how is she so important relative to others who have died and what did she do to deserve such distinction? Alaliac (talk) 20:35, 9 April 2011 (UTC)

I dont know about the reason NASA picked her out the rest but the reasons Zahran is better known is with the bloggers are:

1. She is a woman.

2. The Mubarak's regime made her family lie and say she killed herself (First her family said she died due to police brutality, then they claimed she killed herself and then they said that the government made them say she killed herself).

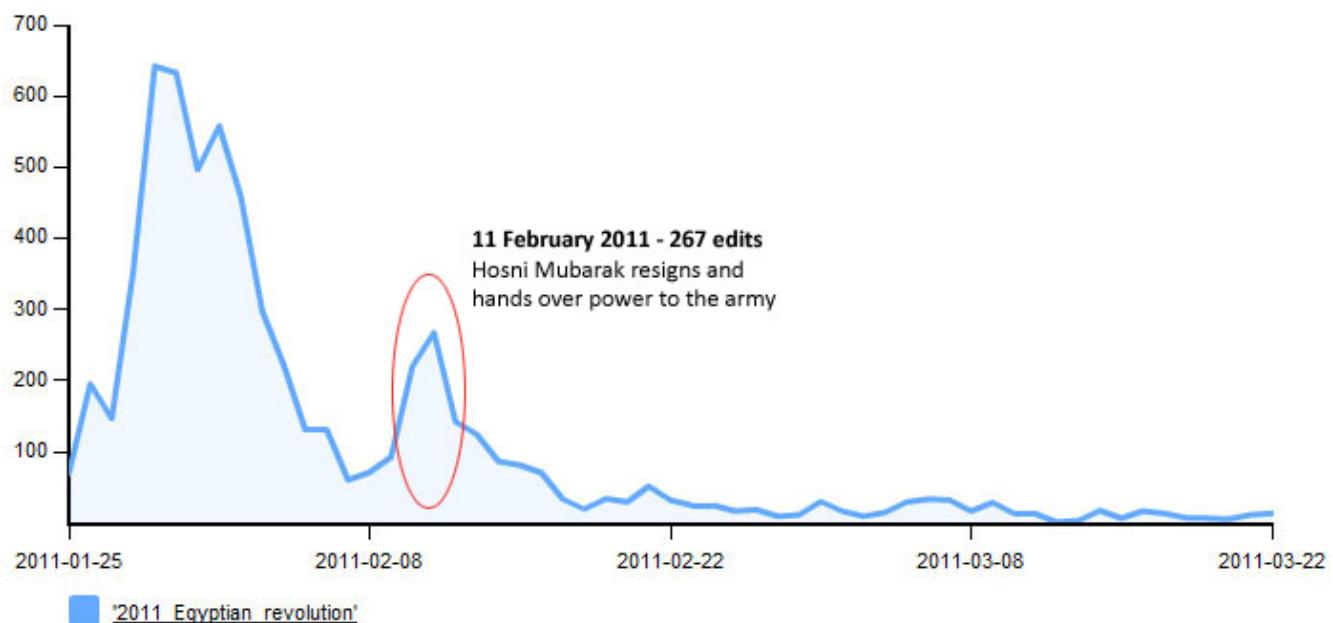
3. Her photo was retouched after her death to make her have a hejab around her head (She was not a Hejaby).

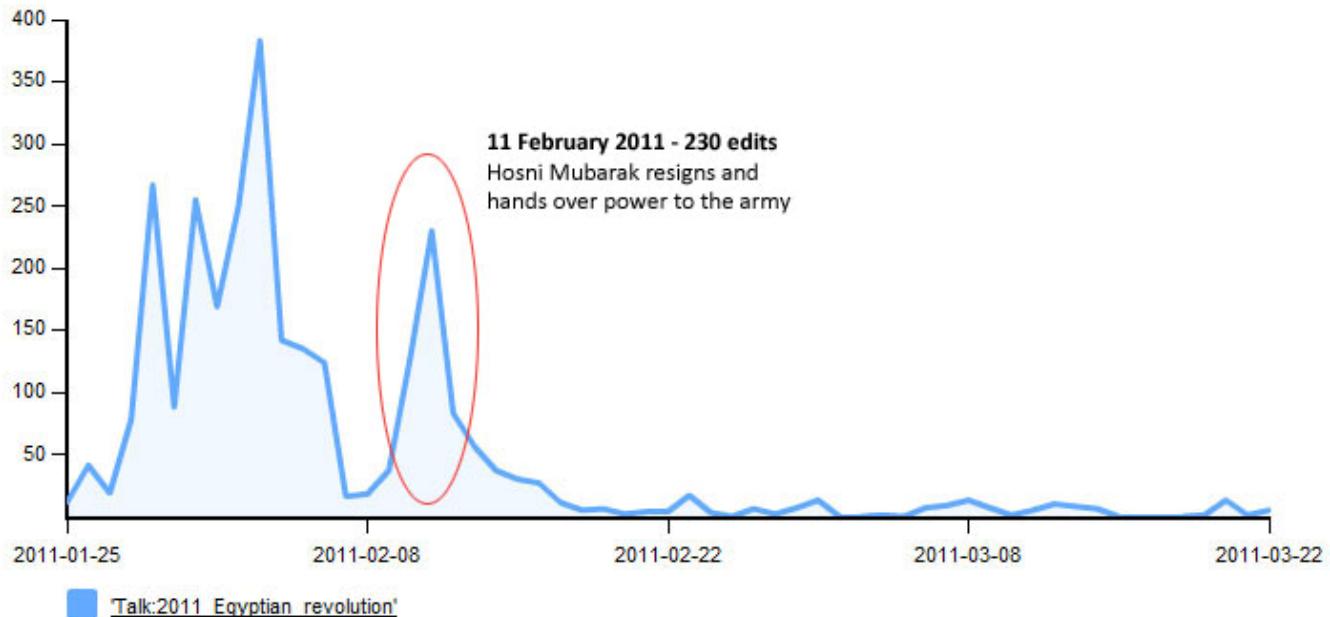
Because of the above reasons she is better known than some of the others. We also have the case of Khaled Mohamed Saeed (Another victim of police brutality); He died before the revolution and he is one of the reasons behind it -- The Egyptian Liberal (talk) 09:09, 18 April 2011 (UTC)

I think we should add something about those details to either the caption or the section, since otherwise it's a bit confusing why she of the other hundreds is mentioned. Ocaasi c 10:22, 18 April 2011 (UTC)

As the previous comments show, the XML files provided by Wikipedia include information not only about the author, but also about the date and time of each edit, offering an interesting opportunity to carry out longitudinal studies of collective memory processes as they unfold over time (Ferron & Massa, 2011).

In this regard, Figure 5 shows the magnitude of edits in time for the "2011 Egyptian revolution" article and its talk page on the English Wikipedia (Wikichanges; Nunes, Ribeiro, & David, 2008).





Figures 5a & b. Number of edits over time to the “2011 Egyptian revolution” article on English Wikipedia, as well as to its related talk page (Wikichanges).

It is possible to observe that, during the first days, editing activity is at its most, with an average of almost 524 edits per day January 28–February 2, 2011, in the article page, and about 235 edits per day from January 29–February 3, 2011, in the talk page (Wikichanges). Furthermore, it is interesting to note that, in both the article and the talk page, editing activity increased on February 11, 2011, when Egyptian President Hosni Mubarak resigned. A similar increase of activity can be observed for the pages about the Tunisian revolution on the English Wikipedia, where the number of edits to the article raised from 88 on January 14 to 192 on January 15, 2011, when Saudi Arabia officially announced that it was hosting the former Tunisian president Zine El Abidine Ben Ali. In a similar way, discussions increased on the talk pages, which went from 5 edits on January 13 to 23 and 33 respectively on January 14 and January 15, 2011 (Wikichanges).

The data presented so far about user activity related to the North African revolutions indicate that Wikipedia can be a perfect playground for the study of how collective memory processes take place through discussions and communicative interactions by thousands of people in different online communities.

While we focus mainly on the activity on Wikipedia related to the Egyptian revolution in this paper, very similar patterns can be observed also for the pages on other recent revolutions and protests in North Africa, which were promptly grouped into a category named “2010–2011 Arab world protests”

(Wikipedia.org, 2011i). As of March 10, 2011, this category contained eight subcategories, including the ones related to the Algerian, Egyptian, Libyan, Tunisian, and Yemeni protests.

For instance, as of March 4, 2011, the majority of the top 20 most edited pages on English Wikipedia during the previous month were about traumatic events, most of which related to the Middle East and North Africa protests (Table 3). Moreover, it is worth observing that two of the most edited pages were related to the 2011 Christchurch earthquake and the 2011 Canterbury earthquake, two different articles which describe the same earthquake, which occurred in New Zealand on February 22, 2011. This suggests that collective memory activities could also possibly take place for events, which are different from the North African revolutions, but inherently traumatic for other reasons.

Table 3. The 20 most edited pages of the month on English Wikipedia, as of March 4, 2011 (Wikirage).

1. 2011 Libyan uprising	11. 2011 Egyptian protests
2. 2011 Libyan protests	12. 2010–2011 pro-democracy protests
3. Deaths in 2011	13. 2010–2011 Pro-democracy protests
4. 2011 Christchurch Earthquake	14. 2010–2011 North Africa and Western Asia protests
5. 2010–2011 Arab world protests	15. 2010–2011 Pro-democracy protests
6. 2010–2011 Middle East and North Africa protests	16. 2011 Libyan Revolt
7. The Undertaker	17. 2011 Canterbury earthquake
8. Egyptian Revolution of 2011	18. Gary Moore
9. 2011 Egyptian revolution	19. 2011 Wisconsin protests
10. Watson (artificial intelligence software)	20. Libyan Revolution

This section described the richness of activities related to collective memory building on Wikipedia. Clearly, Wikipedia is an ongoing community in continuous development, and the previous empirical data have limited validity in time, so this section should be considered a snapshot of the richness of the phenomenon. The next section will highlight possible research directions aimed at exploring these data with automated or semi-automated analysis, in order to shed light on how we, as a society, construct our collective memories in the new digital era.

Directions on Empirical Research on Collective Memories Formation in Wikipedia.

Wikipedia provides several behavioral guidelines for users. One of the most important is the Neutral Point of View mentioned above (Wikipedia.org, 2011d), which consists of presenting all the significant perspectives published by reliable sources. An essay on Wikipedia warns against "recentism,"

which consists of contributing to an article without a long-term historical view (Wikipedia.org, 2011j). Another one, entitled "Wikipedia is not a newspaper," states that, while most newspapers are journals of current news and sometimes disseminate the opinion of their authors, Wikipedia should be an online encyclopedia based on reliable sources and written from a neutral perspective (Wikipedia.org, 2011k). Moreover, an official policy explains that Wikipedia should not offer first-hand news reports on breaking stories (Wikipedia.org, 2011l).

However, even if Wikipedia policies and essays firmly state that users should treat current happenings with caution, the 77% of articles about recent traumatic events—those which have occurred after Wikipedia's 2001 launch—are created, at most, two days after the related events (Ferron & Massa, 2011). This is true for the article on the July 7, 2005, London bombings, which was initiated at 09:18 of July 7, 2005, only few minutes after the first bombings. But it is also true for the current protests in Egypt (see Table 2), Libya, etc. In fact, when it comes to events that shake the core of a community's identity, it is difficult to stop thousands of people from actively participating in the collective representation of the present. And it seems to be especially hard to stop a few thousand people who feel the current issues to be burning and extremely worth world attention, as it surely feels for the people involved, physically or emotionally, in protests, revolutions, uprisings, and traumatic events.

As we already mentioned, one of the most important policies of Wikipedia is the Neutral Point of View (NPOV). However, especially in the talk pages related to controversial issues, we can often observe heated discussions, which sometimes end in edit wars, when users repeatedly reverse the previous user's edits in attempt to make their own version of the article visible (Kittur et al., 2007). For this reason, following Pentzold's analysis (2009), we believe that, during the initial moments after a traumatic event, the collective memory is still interactive, disorganized, and unstable. In other words, the memory is still communicative (Assman, 1995; Pentzold, 2009), meaning that a globally agreed-upon perspective is far from being reached while many users are advancing highly different and subjective points of view. Indeed, during the initial protests of the 2011 Egyptian revolution, Wikipedia was also used to advance diverging positions, as the comments on the talk page reported above suggest. However, as time goes by and the strong emotional reactions to the traumatic happenings gradually soften, it seems likely that a more neutral point of view will eventually be reached. The number of direct contributions to the articles will tend to decrease, and a substantial part of them will be minor edits or indirect work for maintenance purposes (Kittur et al., 2007). In this way, one day, the community will be able to agree on a common narrative of the past, allowing the collective memory to gradually reach the cultural level, becoming more stable and objectified (Assman, 1995; Pentzold, 2009).

We argue that this slow and progressive process of transformation from communicative to cultural memory can now be investigated online in real-time, in large populations and in an empirical way, as it unfolds over months and years, through edits and discussions on this new technology-based global memory place (Nora, 1996). Moreover, past research has suggested the presence of commemoration practices in articles and talk pages about traumatic events, showing that, during anniversaries, editing activity increases significantly (Ferron & Massa, 2011). These spikes of editing activity during anniversaries can be interpreted as a sign of commemoration processes, whose importance for memory building has been described in terms of memory retelling and interpretation of the past through the negotiation of different narratives and perspectives (Zerubavel, 1995).

The possibility to record and analyze the large amount of data available on Wikipedia about discussions and negotiations of different narratives and interpretations of the past represents a unique opportunity for social science, and in particular, for the study of collective memory processes. For instance, spotting discussions on different points of view and analyzing the formation of diverse advocacy groups are very interesting research opportunities. Past research addressed the issue of edit wars detection on Wikipedia pages (Bongwon et al., 2007), or implemented social network analysis techniques to detect cliques of coordination in communicative networks and in networks of similarity of edited articles (Massa, 2011). We can identify several empirical questions that would be interesting to address: For instance, do editors who contribute more during the first days generally support the revolution? Are editors who join later more neutral and balanced? Is it possible to cluster users in two or more groups with different points of view? Currently, we have started to address these issues by analyzing quantitative patterns of editing (spikes of edits in time, networks of communications), but collective memory processes can also be explored analyzing the content of the textual contributions occurring in the articles and talk pages related to traumatic events such as the North African revolutions.

With this regard, we are currently implementing automated content analysis tools to explore the patterns of language used in Wikipedia pages related to traumatic events. Cohn et al. (2004) used the text-analysis program Linguistic Inquiry Word Count (LIWC; see Pennebaker, Francis, & Booth, 2001) to analyze blog posts for two months prior to and after the September 11, 2001, attacks. They found signs of pronounced psychological changes in the language used by bloggers, mainly related to an increase of words associated to negative emotions, cognitive processing, social engagement, and psychological distancing during the first days following the attacks.

Our aim is to adapt this methodology and extend it to the larger sample of Wikipedia pages about traumatic events, whose collective memory is built over time by thousands of editors. To this end, we have developed PyWC, a software tool similar to LIWC, and released it as open source. We are currently analyzing if there are statistically significant differences in the use of language associated with various psychological categories, such as words related to positive and negative emotions, between pages about traumatic events and other Wikipedia pages. We are also interested in the evolution, over time, of these indexes in pages related to traumatic events, our hypothesis being that this is another way to detect the gradual transformation from communicative to cultural memory.

The last research direction we briefly highlight in this contribution is related to cross-cultural studies. While there are more than 270 Wikipedias in different languages, and while many of them are built by very active communities, only a few studies have compared them (for example, Hara, Shachaf, & Hew, 2010). It would be interesting to analyze how two or more different language communities build their memories of the same or similar events. For instance, automated text analysis can be implemented in analyzing how different communities built the representations of the 2005 London and 2006 Madrid bombings on the corresponding pages in the English and Spanish Wikipedias. Moreover, since LIWC presently provides dictionaries in seven languages, it would be possible to compare the articles and talk pages about the same events on different Wikipedias—analyzing, for example, the pages about the Vietnam War on the English and Vietnamese Wikipedia.

In this paper, we have presented evidence showing that the collective memories of the recent North African revolutions are, indeed, built in a collaborative, sometimes conflicting, manner on Wikipedia.

Our goal in this contribution has been to suggest and provide evidence that Wikipedia is a global memory place in which the processes of negotiation of meaning can be studied empirically. We believe Wikipedia offers an unprecedented opportunity for researchers to study how we, as a society, build our cultural representations of the past. Through Wikipedia edits and discussions, it is possible to empirically and automatically analyze this crucial phenomenon in real-time and on a large scale.

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