Studying collective memories in Wikipedia

Michela Ferron, Paolo Massa

Abstract

The aim of this research is to investigate the formation of collective memories in Wikipedia. Considering Wikipedia as a collective memory place[1,2], we focus on pages about traumatic events such as "September 11 attacks" and "7 July 2005 London bombings", since they can be investigated in the frame of cultural trauma research.[3,4] We consider the final article as the representation of the crystallized collective memories, which are socially built through direct edits to the article and discussions in the associated talk page by Wikipedia users. It has been argued that one of the main functions of collective memory is to satisfy the needs of the collectivity in the present.[5] For example, Wang identified "emotional bonding" and "therapeutic practice" functions, which serve the purpose of developing a sense of "collective intimacy" and to make sense of past events.[6] From this perspective, commemoration through memory sharing activities during anniversaries plays a crucial role in the collective memories processes. In our research, we focus on edit activity on English Wikipedia articles and talk pages during anniversaries. We extracted the pages edited by at least 50 different users, resulting in 450758 articles and talk pages. Out of them we identified around 90 articles and talk pages related to traumatic events, and using regression analysis we compared their edit activity around anniversary with all the other pages. We found that pages characterized by a high relative

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[1] C Pentzold 'Fixing the floating gap: The online encyclopaedia Wikipedia as a global memory place', *Memory Studies*, vol. 2, no. 2, 2009, pp. 255-272.

[2] P Nora, 'From lieux de mémoire to realms of memory', in P Nora (ed.) *Realms of memory. Rethinking the French past,* Vol. 1: Conflicts and divisions, Columbia University Press, New York, 1996, pp. xv–xxiv.

[3] JC Alexander, R Eyerman, B Giesen, NJ Smelser & P Sztompka, *Cultural trauma and collective identity*, University of California Press., Berkeley, 2004.

[4] P Sztompka, 'Cultural Trauma: The other face of social change', *European Journal of Social Theory*, vol. 3, no. 4, 2000, pp. 449-466.

[5] B Schwartz, 'The reconstruction of Abraham Lincoln', in D Middleton & D Edwards (Eds.), *Collective remembering*, Sage Publications, London, 1990, pp. 81-107.

[6] Q Wang, 'On the cultural constitution of collective memory', *Memory*, vol. 16, no. 3, 2008, pp. 305-317.

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amount of edits during anniversaries are more likely related to traumatic events. Our findings provide a first empirical and large scale validation for the study of collective memories in Wikipedia, opening the way for further research on Wikipedia as a collective memory place.

Key Words: Collective memories, Wikipedia, commemoration, edit activity, anniversary.

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1.   Introduction

On 11 September 2001, two hijacked airplanes were crashed into the Pentagon and hit the World Trade Center causing the death of nearly 3,000 people. On 7 July 2005, four suicide bombers attacked the London's public transport system killing 52 people and injuring hundreds. These shocking events left indelible marks on people's consciousness, producing collective mourning and commemorative ceremonies. However, just a few moments after the disasters another kind of collective remembering took place on the online encyclopaedia Wikipedia.

In this article we lay the foundations for the empirical study of collective memories about traumatic events in Wikipedia, following Pentzold's interpretation of the online encyclopaedia as a global memory place.[7] We argue that Web 2.0 platforms and particularly Wikipedia offer new opportunities for enriching collective memory research with quantitative studies.

In the next sections we outline some theoretical premises about collective memory, cultural trauma research and the mediatization of memory. Then, we briefly describe Wikipedia and its interpretation as a global memory place. Finally, we provide a first empirical validation for the study of collective memories in Wikipedia.

2.   Collective memories and cultural trauma

Contemporary perspectives of remembering understand memory as an active process, where what is remembered is actively built and reconstructed every time.[8,9] This dynamic role of memory can be dated back to Bartlett:

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[7] Pentzold, *Fixing the floating gap*.

[8] J Garde-Hanse, A Hoskins & A Reading, *Save as...Digital memories*, Palgrave Macmillan, Basingstoke, 2009.

[9] SD Brown & A Hoskins, 'Terrorism in the new memory ecology: Mediating and remembering the 2005 London bombings', *Behavioral*

> Remembering is not the re-excitation of innumerable fixed, lifeless and fragmentary traces. It is an imaginative reconstruction, or construction, built out of the relation of our attitude towards a whole active mass of organised past reactions or experience.[10]

Bartlett also argued that our memory is influenced by the presence of others and by our social organization. According to Halbwachs, individual memory and identity are always mediated by some collectivity. Hence, individual memory cannot be seen as detached from social factors, but every step of the memory process is influenced by the social resources provided by the environment.[11,12,13] In this work, following Olick and Levy [14], we intend collective memory as the continuous active process of sense-making and negotiation between past and present.

One of the privileged perspectives for the study of collective memories processes is in the framework of cultural trauma research.[15] As Eyerman pointed out[16], trauma as a cultural process is closely related to the formation of emergent collective memory and identity of a group. Even if a particular event originated the traumatic sequence, collective trauma is socially mediated by different cultural processes.

Sciences of Terrorism and Political Aggression, vol. 2, no. 2, 2010, pp. 87-107.

[10] FC Bartlett, *Remembering: A study in experimental and social psychology*, Cambridge University Press, London, 1932.

[11] R Eyerman, 'Cultural trauma: Slavery and the formation of African American identity', in JC Alexander, R Eyerman, B Giesen, NJ Smelser & P Sztompka (eds), *Cultural trauma and collective identity*, University of California Press, Berkeley, 2004, pp. 61-111.

[12] M Halbwachs, *The collective memory*, Harper Colophon Books, New York, 1950.

[13] W Hirst & D Manier, 'Towards a psychology of collective memory', *Memory* vol. 16, no. 3, 2008, pp. 183-200.

[14] JK Olick & D Levy 'Collective memory and cultural constraint: Holocaust myth and rationality in German politics', *American Sociological Review*, vol. 62, no. 6, 1997, pp. 921-936.

[15] Alexander., Eyerman, Giesen, Smelser, & Sztompka, *Cultural trauma and collective identity*.

[16] Eyerman, *Cultural Trauma*.

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However, it is still possible to outline a number of characteristics of potentially traumatic events. According to Neal [17], the traumatizing event should be an "extraordinary event" that causes "disruption" and "radical change … within a short period of time". According to Sztompka[18], it should be sudden and radical, perceived as imposed from outside and as unexpected and shocking. From this perspective, events such as the World Trade Center attacks of 2001, the London bombings of 2005 and the tsunami of 2004 can be classified as traumatic events.

3.   Web 2.0 and social network memories

In the last decades social memory studies produced a number of different conceptual definitions and typologies of collective memory.[19,20,21] Hoskins [22] proposed that the influence of media and their technologies can be at least in part accounted for this increased and diffused attention to memory studies.

According to Hoskins [23], the widespread diffusion of new digital media and technologies raise the need for a paradigmatic shift that takes into account the novel relationship between memory and media. In fact, in the new "digital memory culture" [24] we can connect on social networking websites [25], producing content (and memory) at the same time we consume it,

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[17] A Neal, *National trauma and collective memory: Major events in the American century*, M.E. Sharpe, Armonk, 1998, pp. 9-10.

[18] Sztompka, *Cultural trauma*.

[19] JK Olick, 'Collective memory: A memoir and prospect', *Memory Studies*, vol. 1, no. 1, 2008, pp. 19:25.

[20] Hirst & Manier, *Towards a psychology of collective memory*.

[21] CB Harris, HM Paterson & RI Kemp, 'Collaborative recall and collective memory: What happens when we remember together?', *Memory*, vol. 16, no. 3, 2008, pp. 213-230.

[22] A Hoskins, 'Introduction', in J Garde-Hanse, A Hoskins & A Reading (eds), *Save as...Digital memories*, Palgrave Macmillan, Basingstoke, 2009, 1-19.

[23] A Hoskins, 'Digital network memory', in A Erll & A Rigney (eds.), *Mediation, remediation, and the dynamics of cultural memory*, Mouton de Gruyter, Berlin, 2009, pp. 91-108.

[24] A Hoskins, 'The mediatization of memory', in J Garde-Hanse, A Hoskins & A Reading (eds), *Save as...Digital memories*, Palgrave Macmillan, Basingstoke, 2009.

[25] dm boyd, & NB Ellison, 'Social network sites: Definition, history, and scholarship', *Journal of Computer-Mediated Communication*, vol. 13, no. 1, 2008, pp. 210-230.

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uploading videos and photographs on Youtube and Flickr, and writing the memory of public events in collaboration with others on Wikipedia.

Digital media also provide fast access to sites of memory and collective identity in times of mourning.[26] The contemporary bottom-up participatory culture allows for an evolution of memory building processes, which are not just consumed, but also produced in a decentralized way. The resulting new memory, formed through interactions and connection to digital networks, is potentially visible and accessible to everyone.

Interestingly, the widespread accessibility of these online digital practices and collective memory building processes allow for new research opportunities towards empirical work that overcomes some of the constraints posed by classical theoretical research on collective memory. Scholars can now access blogposts and comments expressing people's thoughts and feelings without giving up the spontaneity of interactions. The Internet provides large amounts of data which researchers can collect unobtrusively and almost in real time, and the massive backup into digital archives allows researchers to conduct longitudinal studies on these data.[27]

4.   Wikipedia as a global memory place
Wikipedia can be one of the most interesting environments in the Web 2.0 landscape for the study of collective memory and cultural trauma processes. Wikipedia is an online encyclopaedia made possible by the spontaneous work of millions of people, who directly modify its articles. Indeed, Pentzold [28] proposed that the online encyclopaedia can be seen as a global memory place, where memory is constructed through the negotiation of different points of view. This is especially true if we consider Wikipedia pages about traumatic events, such as for instance the September 11 attacks (see *Figure 1*).

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[26] Hoskins, *Introduction*.
[27] MA Cohn , MR Mehl & JW Pennebaker, 'Linguistic Markers of Psychological Change Surrounding September 11, 2001', *Psychological Science*, vol. 15, no. 10, 2004, pp. 687-693.
[28] Pentzold, *Fixing the floating gap*.

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Figure 1. Screenshot of the article about September 11 attacks.

Every Wikipedia article has a related talk page in which anyone can discuss the article content and structure, negotiate and suggest improvements or changes (see *Figure 2*).
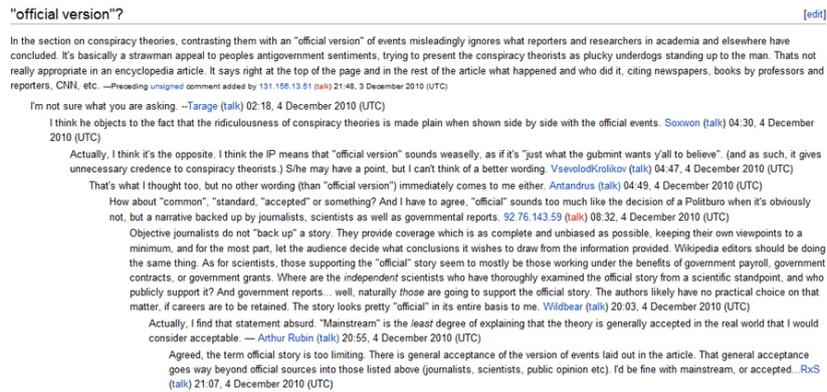

Figure 2. Screenshot of a piece of discussion in the talk page associated to the article on September 11 attacks.

In Wikipedia any change made by any user to any article or talk page is recorded, so that it is possible to reconstruct the entire revision history of each page (see *Figure 3*).

Figure 3. Screenshot of the revision history page associate to the article on September 11 attacks.

According to Pentzold [29], discussions and article editing processes can be seen as transition from communicative memory, which is interactive, informal, disorganized and unstable to cultural memory, which is formal, well organized and objective.[30] In this sense, social interactions occurring in Wikipedia reconfirm once again remembering as a situated activity.

Technologies are crucial in shaping how memory is formed.[31,32,33] Since the aim of Wikipedia is to be an online encyclopaedia, it does not promote original research, advertising and personal opinions.[34] Nevertheless, people make use of Wikipedia articles and talk pages also to express grief and mourning, as reported in the next sections. Hence Wikipedia becomes a perfect playground for the study of memory building activities, possibly allowing for the first time the empirical study on a large scale of collective memory processes.

[29] Pentzold, *Fixing the floating gap*.

[30] J Assmann, 'Collective memory and cultural identity', *New German Critique*, vol. 65, 1995, pp. 125-33.

[31] GC Bowker, *Memory practices in the sciences*, MIT Press, Cambridge, 2005.

[32] N Van House & EF Churchill 'Technologies of memory: Key issues and critical perspectives', *Memory Studies*, vol. 1, no. 3, 2008, pp. 295-310.

[33] Garde-Hanse, Hoskins & Reading, *Save As...Digital Memories*.

[34] Wikipedia: The free encyclopedia. (2010) *Wikipedia:What_Wikipedia_is_not*, retrieved 20 January 2011 at <http://en.wikipedia.org/wiki/Wikipedia:What_Wikipedia_is_not>

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One of the most prominent processes of collective memory building is commemoration, which helps group's members to elaborate past events, fortify emotional ties and recover from traumatic experiences.[35,36]

In our work, considering the new relationship between memory and Web 2.0 services, we consider boosts of users activity on Wikipedia pages related to traumatic events during anniversaries as a clue suggesting the presence of commemoration practices. For instance, taking into consideration the "September 11 attacks" talk page, we can highlight different comments of grief, expressed on the fifth anniversary of the attacks:

> Let us pray for the souls of the deceased instead of insulting their memory by not terming those who so cruelly killed thousands of fathers, mothers, brothers, sisters, friends, as terrorists. (11:08, 11 September 2006)

> […] my sympathy and prayers to those who mourn this day. (14:08, 11 September 2006)

> […] I am saddened by the fact that Wikipedia is not doing enough to mourn this day- including not even mentioning the fifth anniversary on the mainpage. (14:36, 11 September 2006)

> Spare a thought for those whose lives were torn apart that day. (14:39, 11 September 2006)

In this paper we show that collective memory processes happen on Wikipedia and can be empirically analyzed. Specifically, our hypothesis is the following:

> The relative amount of edit activity of Wikipedia's articles and talk pages during the days surrounding the anniversaries can distinguish Wikipedia's articles and talk pages related to traumatic events from other pages.

5.   Methodology, analysis and results

We downloaded from Wikipedia an XML file including the full revision history of all pages of the English Wikipedia at 16 September 2010.

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[35] Y Zerubavel, *Recovered roots: collective memory and the making of Israeli national tradition*, University of Chicago press, Chicago, 1995.
[36] Wang, *On the cultural constitution of collective memory.*

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Figure 4 shows a visual representation of the monthly number of edits over time for the articles on "September 11 attacks", "7 July 2005 London bombings" and "Chernobyl disaster". It is possible to observe the presence of spikes in users' edit activity around anniversaries. The most interesting spikes of activity can be found in correspondence to the fifth anniversary for "September 11 attacks", in July 2006 and 2008 for "7 July 2005 London bombings", and in April 2006 for "Chernobyl disaster" coinciding with the 20th anniversary.
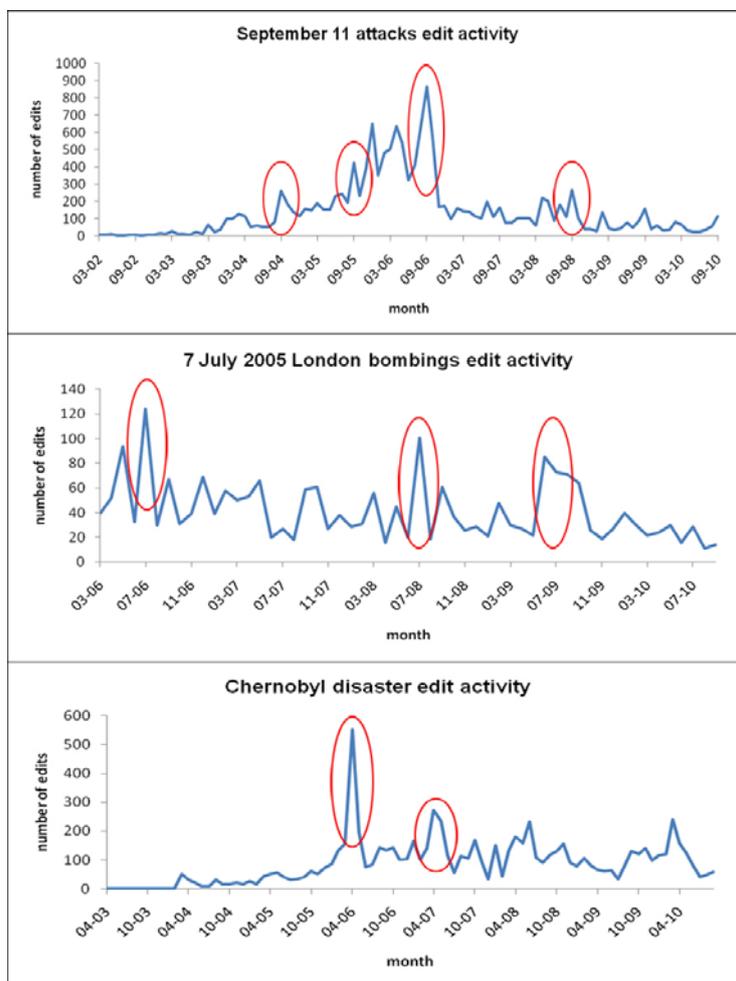

Figure 4. Number of edits per month over time to the articles on September 11 attacks, 7 July 2005 London bombings, and Chernobyl disaster.

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For every article and, separately, every talk page, we collected several information: a sample is reported in *Table 1*.

Table 1. Few examples of the information we computed for every page of English Wikipedia. The complete dataset is available for download at http://sonetlab.fbk.eu/data/.

Pages related to traumatic events	Unique editors	Total edits (Average per day)	Anniversary edits (Average per day)	Average anniversary edits per day / average edits per day
Article				
September 11 attacks	4697	14813 (4.62)	1969 (10.70)	2.32
Attack on Pearl Harbor	3223	8299 (2.59)	1011 (5.35)	2.07
Talk page				
September 11 attacks	2204	17468 (7.22)	2198 (15.48)	2.14
Attack on Pearl Harbor	424	1689 (0.57)	120 (0.71)	1.26
Means and standard deviation	Mean = 740.53; sd = 1108.50	Mean = 1531.16; sd = 2872.90 (mean = 0.63; sd=1.10)	Mean = 182.21; sd = 365.09 (mean = 1.36; sd = 2.43)	Mean = 2.20; sd = 1.35
Other Wikipedia pages	Unique editors	Total edits	Anniversary edits	Average anniversary edits per day / average edits per day
Article				
Gregor Schlierenzauer	125	242 (0.18)	13 (0.20)	1.17
Carlo Gambino	325	691 (0.24)	40 (0.27)	1.12
Talk page				
Sassanid Empire	128	394 (0.20)	19 (0.18)	0.90
Zionism	431	3239 (1.22)	170 (1.16)	0.94
Means and standard deviation	Mean = 180.59; sd = 296.56	Mean = 359.66; sd = 720.98 (mean = 0.17; sd = 0.30)	Mean = 21.36; sd = 49.53 (mean = 0.20; sd = 0.50)	Mean = 1.13; sd = 0.95

In order to take into consideration pages with an adequate level of participation, we excluded from our dataset articles and talk pages edited by less than 50 different users. This filtering reduced our dataset to a

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representative core of 396,412 articles and talk pages. Out of them we identified by hand 88 pages (57 articles and 31 talk pages) related to traumatic events. The remaining group of pages were composed of 377,651 articles and 18,673 talk pages.

Since we are interested in the construction of collective memory through people collaboration, we excluded from our dataset edits made by bots (7.77% of all edits), automated tools that carry out repetitive tasks to maintain Wikipedia pages.

For every article and talk pages we collected the date of first edit, i.e. of creation of the article or talk page. Our dataset contains 30 articles and 21 talk pages about traumatic events happened after the launch of Wikipedia in 2001. Out of them, 23 articles (77%) and 13 (62%) talk pages were created within two days after the event.

As introduced above, we focus on the amount of edit activity around anniversaries. Precisely, we consider the period of 21 days around the anniversary of the event, i.e. a time window of ten days before and after the anniversary. Since our goal is to compare edit activity patterns between traumatic event pages and other Wikipedia pages, we consider for the latter ones, which do not necessarily refer to events with precise dates, the period of 21 days around the anniversary of the creation date. This assumption is reasonable since pages about traumatic events occurred after the launch of Wikipedia in 2001 tend to be created few minutes or days after the event occurs. In this sense, page creation date and event date are very close, allowing us to enlarge our dataset and base our results on a larger empirical evidence.

We filtered out all the edits made in the first six months after the creation of a page, a period in which the discussion can be very heated but is not related to commemoration activities.

For comparative purposes we computed for every page an additional variable, the ratio between the *average number of edits per day during anniversaries* and the *average number of edits per day*.

Intuitively, if the number of edits was almost the same every day, the ratio would be around 1. For instance, a ratio of 3 would suggest that an edit during the anniversary is 3 times more probable than in any other random day. Considering all the articles and talk pages related to traumatic events, the average ratio is 2.20 (sd = 1.35), while for other Wikipedia articles and talk pages the average value is around 1.13 (sd = 0.95). This suggests that edits to pages related to traumatic events are 2.2 times more likely to occur during anniversary periods, while other pages are edited more constantly along the years.

In order to verify if this ratio can significantly distinguish between pages related to traumatic events and other pages, we applied two logistic regression models for articles and talk pages with traumatic as binary

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dependent variable and the ratio *average anniversary edits per day / average edits per day* as independent variable.

With regard to articles, the regression coefficient for the ratio *average anniversary edits per day / average edits per day* is statistically significant (estimate = .315; p < .001). This means that an increase of one unit in this variable increases significantly the log-odds in favour of an article related to a traumatic event by an estimated .315. As for talk pages, the regression coefficient for the ratio is also statistically significant (estimate = .223; p < .001).

In this section, we showed that the relative amount of edits during anniversaries can significantly discriminate between pages related to traumatic events and others, meaning that pages characterized by a ratio are more likely related to traumatic events.

In order to let other scholars reproduce our analysis and improve it, we released the full dataset used in this work at http://sonetlab.fbk.eu/data/.

6.   Discussion and future work

In this work we open the way to the empirical study of collective memory processes on a large scale. We found that pages with a high relative amount of edits occurred during anniversaries are more likely related to traumatic events. These results suggest the presence of increased discussions and commemoration activities carried out by Wikipedia users on pages related to traumatizing events, during their anniversaries.

In this work we consider the page creation date as anniversary for Wikipedia pages which do not necessarily refer to events with specific dates. It would be interesting to complement this research with a comparison between pages about traumatic events and pages referring to non traumatic events.

We argue that the increased activity during anniversaries for pages related to traumatic events are part of the collective memory building process. However, the quantitative analysis we present does not allow to draw conclusions about the reasons of this result. Therefore, our future work will be focused on investigating the actual content of Wikipedia pages using natural language processing techniques.

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Michela Ferron is a PhD student at the Center for Mind/Brain Sciences of the University of Trento and collaborates with the SoNet (Social Networking) research group at IRST (Institute for Scientific and Technological Research) at Bruno Kessler Foundation (FBK) in Trento, Italy. Her research interests vary from cognitive and social psychology to the study of social aspects of Web 2.0. At the moment she is studying the formation of collective memories on the Web.

Paolo Massa is a researcher at IRST (Institute for Scientific and Technological Research) at Bruno Kessler Foundation (FBK) in Trento, Italy, where he leads the SoNet (Social Networking) research group. He received his PhD from ICT International Graduate School of University of Trento in March 2006, defending a thesis titled "Trust-aware Decentralized Recommender Systems". Paolo's research interests include trust and reputation, recommender systems and commons-based peer production phenomena such as Wikipedia. A list of his publications is available at http://www.gnuband.org.