# A Funny Thing Happened on the Way to the Website: Telling about Browsing

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## Abstract

This paper describes an approach to the narrative organisation and experience of browser history. It can be difficult to remember where you have been online and consequently hard to get a sense of how much time you have spent, what you did, and why. Web browsers are limited to bookmarks and browser history for retrospective examination. This study is focused specifically on a narrative construction of browser history and the resolution of the resulting experience. The paper establishes a methodological and theoretical connection between expressions of browsing activity and the tradition of narrative enquiry and suggests a range of experimental outputs.

## Author Keywords

Interfaces; display; materiality; data environments, digital objects; physical interactions.

## ACM Classification Keywords

H.5.m. Information interfaces and presentation

## Introduction

I get to my desk in the morning and start by checking my personal messages across three different webmail addresses. I can see that I have 20 new messages since yesterday. At a glance five of them are automatically generated by my social media accounts; comments on my Facebook posts, LinkedIn notifications, someone new following me on Twitter. They can be deleted. Only the Facebook messages need a response since I am curious to see who has said what about my posts. So from webmail I go to Facebook. While there I check the comments, respond to one and look at all the new posts in my network from across the world. I take a spontaneous break and go to my favourite news website to read the headlines.

From the lead article I jump to a video then back to the home page then scan three more articles the last of which refers to a world leader I've never heard of. So it's off to Wikipedia to find out about a recently elected African President. After that I go back to my inboxes and deal with the messages that require more in-depth action. One of them is a request for budget information for a long-running project. There must be some urgency because the person who sent the email also sends me an SMS, which I receive on the smartphone at my elbow. I reply to the text message and start retrieving information from archived project emails that contain the relevant documents. I compose a detailed reply with the relevant figures, press send, and turn to the next message. This turns out to be a much more involved request to set up meetings, devise a curriculum, and put together a presentation so I create a Doodle Poll and invite the relevant people to it. The curriculum work can wait but I make a start on the presentation, searching the web for relevant images, which I save as screenshots and import into Keynote. This involves some very rapid switching between my web browser (which has 10 tabs open) and the presentation application.

I've been sitting down for two hours.

It can be difficult to remember where you have been online and consequently hard to get a sense of how much time you have spent, what you did, and why. The relentless onward thrust of internet activity, and the structure of hyperlinked documents immerses people in a persistent stream of newness leaving the personal and social story of online life elusive. Attention wanders, and pages update, videos launch, links reroute, bookmarks accumulate with minimum intervention from people.

The average time spent on a webpage is less than 30 seconds [47] (2011) and page loading delays of 450 milliseconds are intolerable to most [49] (2012). Browsing infrastructure including; bandwidth, software, transfer protocols, connection speeds, and HTML are all optimised for speed and efficiency. The web is designed to be a fast moving environment and browsing software is limited to bookmarks and browser history for retrospective examination. Recent work on slow technology [4], human-centred interaction [5], and tangible interfaces [24] has addressed this mismatch between how computer systems and interfaces work at speeds beyond human comprehension and collect data on a scale we are poorly equipped to analyse. My research uses the browser history function as a place to experiment with designs for human-scale interaction and narrative representations of online activity.
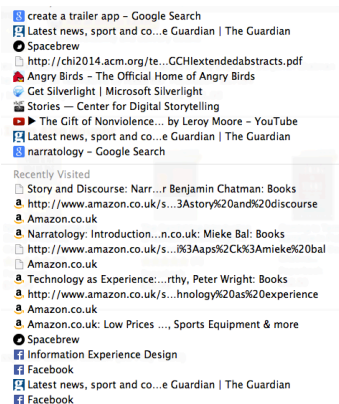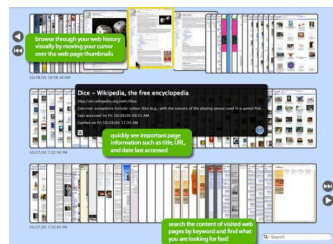
Figure 1, Browser history list



Figure 2. BrowseBack

## Background

Browser history is the standard software function for tracking past internet activity in web navigation applications. The most commonly used browsers; Safari, Opera, Firefox, Chrome, and Explorer all offer full text search of websites visited via a browser history function. Browser history metadata includes; time spent, sites visited, time visited, specific pages viewed and the capture of all html text on visited pages. As an expression of what people do online, browser history is a detailed, searchable, granular record. This record is usually presented as a time-stamped list of entries (Figure 1), ordered in rows chronologically. While there are different permutations for this list, such as a grid of screenshots of pages viewed, the way the data is presented often prevents useful inference for knowledge gathering, reflection (or even finding a site visited two days ago). The list form makes no representational difference between a site visited three hours ago to watch a video and a click on the browser history list to try and re-visit that site, it flattens human experiences with quite different motivations to a rigid database form.

## Related work

Browser history has been a popular subject for HCI researchers since the early days of the web. Much of the research is focused on strategies, systems, and mechanisms for *revisitation*, i.e. Tools that allow people to easily re-find web pages they have previously visited. MosaicG [2], PadPrints [8], Contextual Web History [27], WebView [14], FootPrints [34]. BrowseBack (Figure 2) [51], MindRetrieve [52], Browsing Icons [6], Domain Tree Browser [7], and Visual Snippets [1] are all practical implementations of this idea. This work is mostly concerned with establishing a visual basis for experiencing browser history and draws on corresponding theories about perception, visualisation mechanisms and associated interactions. For example Google's History Timeline (2013) [50] is a chrome browser extension that shows browser history in a vertical-scrolling visual format. Content boxes are arranged chronologically either side of a central spine. Expanding the understanding of web navigation history beyond various visualisations of that list, and accounting for a wider browsing experience is consequently a goal for my research which views current systems for historical viewing as inadequate.

Practical research outcomes have commonly been expressed as interactive graphs [34][6], scaleable tree diagrams [2], miniaturised web page visualisations [1][26][15] and other screen-based digital artefacts. Most of the above work on browser history is based on large-scale studies of navigation behaviour dating back to 2001 [16] before the social web phenomenon, or the large scale uptake of smart mobile technologies for browsing. Some problems with the existing research are revealed by the present predominance of touch interfaces, tabbed browsing, the decline of the page-based web in favour of an apps ecology, and widespread access to fast connection speeds. For example, it is still much faster to use a search engine for web backtracking than to navigate the browser history list. There are also acknowledged problems with extrapolating people's behaviour from browser history. Weinreich et. al. [26] observe how 'the data of clickstream logs have a limited expressiveness, as aims and tasks of the users often stay below the surface'. This insight informs the following section where I will

outline what is meant by narrative in this particular research context.

## Study Propositions
The propositions of this study are that a narrative representation of web browsing history data is more conducive to meaning-making and useful insight than an automatically generated list hidden in a sub-menu of the browser navigation system. Meaning making has been described as a process 'in which individuals construct mental models that ground their understanding in a deeply personal and unique fashion' [40] and more simply as 'making sense of experience' [17]. This research gives attention to what kinds of instruments might be useful for making narrative sense of browsing experience.

While there may be other ways of structuring internet browsing history data more or less conducive to understanding, this study is focused specifically on narrative construction. The proposition suggests that browser data can be analysed using a range of qualitative and design research methods, and explored for meaning potential. Server logs capture all website visits, page visits, clicks, and interactions, and this data is analysed by computer software and exploited for commercial and political opportunity [30][33]. Browser software records a history of internet use and shows it as a chronological list of URLs. The purpose of this study is to present this data in a way that people can extract meaning from.

Possible meanings might include insight into their own behaviour, an understanding of how much their browsing data reveals about them and opportunities for action and transformation.

## Narrative knowing
The narrative-phenomenological aspect of technologically mediated experience is described by McCarthy and Wright [36]. Their ideas include an aspect of lived experience they call 'The compositional thread'. 'In a … technologically mediated communication, it refers to the narrative structure, action possibility, plausibility, consequences, and explanations of actions.' They use the example of internet shopping to explain how the structure of a website can lead people through a particular sequence of actions towards a virtual checkout. This is framed as a narrative in the sense that it has a predetermined outcome and set number of interactions possible. Their theory is elaborated further to include the idea that the sense and meaning of experiences is created or enhanced by what Jackson [28] calls 'framing experience'. The events and actions that constitute human experience can appear arbitrary and meaningless unless deliberately framed in some way. 'If experience is to be aesthetic, we have to put some effort into it by thinking about what we do and by providing a meaningful background against which the meaning of events can emerge'. By framing web browsing narratively we can bring structure and meaning to the experience. My research attends to this idea by the design of a narratively framing artefact intended to provide the background against which meaning can emerge.

Narratology refers to the structure of narratives. How they work, what characteristics they share, and how to classify them. The following section will lay out the basis for a narrative framing of web browsing. At first glance web browsing would appear to lack many of the

prerequisites for what constitutes a narrative; plot, characters, unity of action, linear progression. A definition proposed by Bal [3] includes the division of narrative texts into three levels. *Stories* are sequences of events, such as a character leaving home and travelling to work on a train. *Texts* are versions of stories. The same story can be told in many different ways, i.e. As a letter, a dialogue, or a comic. *Fabulas* are a series of 'logically or chronologically related events caused or experienced by actors'. Taking these levels in turn; the *story* of a web browsing session can be seen as a sequence of events; I check my email, then I read the news, then I post an image to Facebook. *Texts* can be the various instances of web pages, differentiated by their design, layout, possible interactions etc. *Fabula* can be the consequences of my actions online; a new page is launched, a video plays, text scrolls. Bal specifies that *actors* can be non-human, raising the possibility for a view of computers, more specifically the software that runs the world wide web (such as html and javascript), as actors in their own texts. Also relevant for my view of web browsing as a narratively framed act is Bal's application of her theory to 'connected series of human actions'. A single browsing session can also be seen as an episode in the larger story of personal internet use.

Chatman [12] takes the idea of the framing of human actions in sequence further with his conception of story *kernels*. Kernels are the most important parts of a narrative structure. They are the points from which the action develops. 'They are nodes or hinges in the structure, branching points which force a movement into one of two (or more) possible paths' [12]. The significance for a narrative conception of web browsing

is seen in how hyperlinks work. I make decisions about where to go and some parts of any website and browser fulfill that need; the back button, hyperlinks, commenting functions etc. There are many other classifications of what constitutes narrative such as those from Bruner [10] who emphasises the construction of reality, Laurel [31] who writes about performance and Mateas [35] who concentrates on games. Present limitations of space prevent more in depth analysis of these perspectives.

**Narrative Researching**
Narrative enquiry is a way of approaching qualitative research that prioritises narrative ontologies, epistemologies and methodologies. Continuity is held to be an important quality in the study of people and society. Individuals and groups exist in time. Studying people and society must also consist of being aware of past, present and future as they affect the topics of research. Narratively driven research crosses disciplinary boundaries and is carried out in anthropology [23], psychology [10], sociology, [39] and design [11] as a way of understanding the mechanisms behind what people do and why. The speed at which societies change and the ambiguities inherent in researching everyday life leads to what Geertz calls the 'grand contraptions' of researchers [23]. Anthropologists can only ever deliver incomplete, improvised accounts of the world and grand contraptions need underlying narrative unity in the form of 'tableaus, anecdotes, parables, mini-narratives with the narrator in them'. Narrative accounts of a browsing session should take the form of a unifying device featuring 'pieced together patternings' [23] to account for the messiness of different time scales and
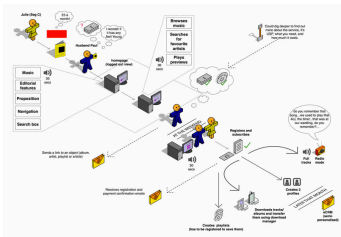
motivations.

Narrative is seen as giving coherence to research accounts where there may be no other unifying factor other than location or time. A browsing session experienced in narrative form can shape impressions of time spent online, websites visited, tasks completed. Narratives are also seen as transmitting devices for knowledge. A browsing session could be shared with others and impart knowledge not just about individual behaviour (images of sites visited) but also about where to go online i.e to buy a new car.

Narrative research takes the form of 'field texts' [13]. Field texts can be interviews, autobiographical writing, recordings, letters, films, photos, drawings, any narrative text in the Bal sense of 'versions of a story'. A browser log file can be seen as a field text in that it is tied to person, time, and an interactional context (the sites visited). Some tension is acknowledged from a research perspective in that the log file is generated automatically. Whose story does it explain? My research proposes a ways of reflecting on this file, a background structure that gives meaning.

Research narratives can be either *descriptive* or *explanatory* [41]. They either give an accurate description of the world or attempt to explain it. This formulation receives an echo in Rogers' overview of theory and what it is for in HCI [43]. To descriptive and explanatory she adds *predictive* 'enabling predictions to be made about user performance', and *generative* 'enabling practitioners to create or invent something new'. A narrative framing of web browsing can perform the same function as theory, it can describe, explain, predict, or generate.  For my research, narrative is at

the same time an epistemological standpoint, a methodological framework and a design output.

## Narrative Designing

Narrative work has received plenty of attention in the HCI world as a way of designing artefacts and systems. User journeys (Figure 3) [9][37], scenarios [38][11], directed storytelling [21], and diary studies [19][42] are all well-established ways of eliciting system requirements. These ways of doing design use narrative as a method, an instrument or artefact for proceeding through the various stages of making computer systems and interfaces that are relevant and useful to people. They are goal driven to the extent that the methodological outcomes can be seen as contributing more or less value to the final product. As methods they also sit inside the tradition of ethnographic enquiry pursued by HCI research - in many contexts now considered routine in the doing of computer related design. Ethnography and Ethnomethodology as key approaches to HCI theory came to prominence in the early nineties as part of what Rogers calls 'the turn to the social' [43]. For HCI theorists and practitioners narrative is often connected to research methods via ethnographic enquiry, finding out what people think about the world or about a design prototype.

## Study Design

My research draws on a rich texture of design research methods and a more orthodox quantitative approach. The case study is intended to be a mixed or multi-strategy design using the Explanatory Design: Follow up Explanations model [18]. This model is used 'when a researcher needs qualitative data to explain or expand on quantitative results' [18]. Although the emphasis is

Figure 3. User Scenario diagram

http://jasonunes.com/2009/01/08/great-design-for-user-scenarios/

usually on the quantitative in this type of design, there is room for a more balanced approach.

The two-phase nature of the model means data is collected at different times and the final report can be written in different phases. Challenges include the length of time needed to carry out data collection, and the differences in analysis needed. Results are not integrated but compared and tracked, i.e. outcomes from diverse methods are not merged and analysed together but treated separately.

The research takes a number of experimental forms intended to cast light on browser activity through the lens of narrative design. Since I am interested in how people view their own browsing behaviour this is a participative design study. The procedure is designed to elicit creative expression from participants that will inform the creation of design outputs.

## ComicStory

Participants create visual representations of browsing activity in different categories such as; casual visit, mistaken visit, long term interest, repeat visit, prompted visit. These representations are compiled into a visual language (Figure 4). A visual printed story is created at the end of each browsing session. This is intended to be similar to an EEG readout as a record of what was done during the session. Information included is associated with existing metadata and arranged as in a comic or graphic novel. Principles of sequential storytelling inform the design and lend the opportunity for semantic differentiation. i.e. Websites where people have spent the most time are shown as graphically more important. A composition of these prints laid out together gives an overview of longer term browsing

Figure 4.

ComicStory by John Fass

patterns. Prints can be scanned and shared.

## SpeakEasy

Participants think aloud while browsing the web, keeping up a running first person commentary on what they are doing and why. The resulting sound file can be experienced as a podcast for distribution and as a SoundCloud file for detailed interrogation of the timeline. The spoken soundtrack can also be transcribed. The sound files can be thought of as episodes. A more practical implementation of this concept is to automatically generate a commentary from a library of sounds (much like a car SatNav) as people browse the web. They can be used a guide for others or as a way of reflecting on what people have done.

## RealReel

Screenshots are automatically captured every ten seconds during a browsing session. The resulting still images are compiled to a quicktime file and act as frames in a movie of the browser session. Commentary can be added. Individual frames contain standard metadata and can be used for retrieval, revisitation, organisation and reflection. Movies can be distributed, edited, archived, and shared. The intended interface is similar to movie editing software such as Final Cut Pro or Adobe Premiere. Stills are presented along a timeline and can be re-arranged according to how people wish to tell the story of their browsing session.

## Discussion

Web browsing involves moving around and through a virtual space doing different things. It features entry
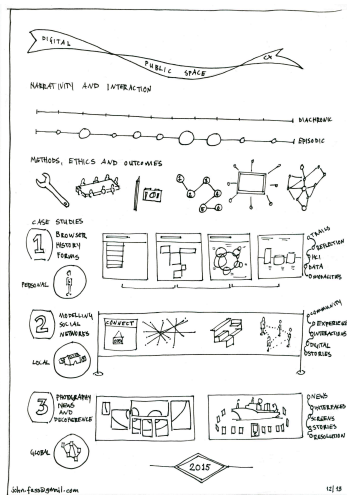
and exit points, actions in a temporal sequence, and a protagonist acting in personal and social context. Designs that exploit web browsing narratively could fulfill various aims: 1. Viewing a browsing session as a story can provide reflection on what was done and why. Comparison across the different sessions in a week can elicit understanding of what tasks are the most important, how distracted people are and where they go most often. Sharing these stories can help establish common interests, and build relationships. 2. Session stories can help with retrieval and revisitation, an important function of search, bookmarks, and the browser history list. Presenting browser sessions as complete stories can help track down pathways to useful content, can help identify where and when people saw it. Comparing across stories can help find project-related content in amongst the 'noise' of distracted web browsing. 3. Session stories can be saved, archived and cross referenced as an aid to organisation. By viewing them together people can exploit the information they contain when motivations have changed, websites moved, content disappeared. They can also be reconfigured to show different

information since they automatically contain URLs, time stamps, page images, a descriptive text snippet, and the opportunity to 'see more' or 'remove from history'. 4. By framing browser activity narratively the implications of what people do and their relationship to the wider system can be explored. Web companies glean information about people from where they go online and serve them advertising mathematically calculated to appeal to them. The power relationship is skewed in favour of those with the tools to algorithmically interpret browser activity. By placing a measure of analytical ability in the hands of people, some balance may result.

## References

1. André, P., Cutrell, E., Drucker, S. M., Fisher, D., Hu, C., Ramos, G., Teevan, J., Visual Snippets: Summarizing Web Pages for Search and Revisitation, Proc. CHI'09, ACM Press, 2009.

2. Ayers, E. Z., Stasko, J. T., Using Graphic History in Browsing the World Wide Web, GVU Technical Report, Georgia Institute of Technology,1995.

3. Bal, M., Narratology: Introduction to the Theory of Narrative, University of Toronto Press, 2009.

4. Banks, R., Kirk, D., Odom, W., Regan, T., Selby, M., Sellen, A. 2012. Photobox: on the design of a slow technology. *Proc.* DIS '12. ACM, New York, NY, USA, 665-668.

5. Bannon, L. J. Re-framing HCI: from human-computer interaction to human-centred interaction design. *Proc.* CHItaly, Eds. Patrizia Marti, Alessandro Soro, Luciano Gamberini, and Sebastiano Bagnara. ACM, New York, NY, USA, 17-18. 2011.

6. Bederson, B., Mayer, M. Browsing Icons: A Task-Based Approach

for a Visual Web History, HCIL Technology Report, 2001.

7. Bederson, B., Gandhi, R., Kumar, G., Schneiderman, B., Domain Name Based Visualization of Web Histories in a Zoomable User Interface, Proc. Eleventh International Workshop on Database and Expert Systems Applications, pp. 591-598, 2000.

8. Bederson, B. B., Helfman, J. I., Hightower, R. R., Hollan, J. D., Ring, L. T.,  PadPrints: graphical multiscale Web histories. In Proc.UIST '98. ACM, New York, NY, USA, 121-122, 1998.

9. Benford, S., Giannachi, G., Koleva, B., Rodden, T., From interaction to trajectories: designing coherent journeys through user experiences. *Proc. SIGCHI Conference on Human Factors in Computing Systems* (CHI '09). ACM, New York, NY, USA, 709-718.

10. Bruner, J., Life As Narrative, Social Research, 54, 11-32, 1987.

11. Carroll, J. M., Scenario Based Design: Envisioning Work and Technology in System Development. New York, Wiley, 1995.

12. Chatman B. S., Story and Discourse, Narrative Structure in Fiction and Film, Cornell University Press, 1980.

13. Clandinin, D. J., Connelly, F. M., Narratuve Enquiry, Jossey-Bass, 2000.

14. Cockburn, A., Greenberg, S., Jasonsmith, M., Kaasten, S., McKenzie, B. WebView: A Graphical Aid for Revisiting Web Pages, Proc. OZCHI'99 Australian Conference on Human Computer Interaction, 1999.

15.  Cockburn, A., Greenberg, S., Issues of Page Representation and Organisation in Web Browser's Revisitation Tools, Australasian Journal of Information Systems, Vol. 7, No 2, 2000.

16. Cockburn, A., Greenberg, S., What do Web Users do? An Empirical Analysis of Web use, Int. Journal of Guman Computer Studies, 54(6): 903-922, 2001.

17. Courtenay, B. C., Merriam, S. B., Reeves, P. M., *The Centrality of Meaning-Making in Transformational Learning: How HIV-Positive Adults Make Sense of their Lives*, Adult Education Quarterly Winter 1998, Vol. 48 no. 2 65-84.

18. Creswell, J. W., Plano Clark, V. L., *Designing and Conducting Mixed Methods Research*, Sage Publications, 2007.

19. Czerwinski, M., Horvitz, E., Wilhite. S. A diary study of task switching and interruptions. *Proc. SIGCHI &* CHI '04 ACM, USA, 175-182.

20. Dennett, D., Why Everyone Is A Novelist, Times Literary Supplement, September, 1988.

21. Evenson, S., Directed Storytelling: Interpreting Experience for Design, Design Studies: Theory and Research in Graphic Design, A Reader, Princeton Architectural Press, 2006.

22. Faste, H., Spaulding, E., Design-Driven Narrative: Using Stories to Prototype and Build Immersive Design Worlds, Proc. CHI2013, ACM Press, 2013.

23. Geertz, C., After the Fact, Harvard University Press, 1996.

24. Gerardi, S., Khaled, A. O., Mugellini, E., Rubegni, E. Using personal objects as tangible interfaces for memory recollection and sharing. *Proc* TEI '07. ACM, New York, NY, USA, 231-238. 2007.

25. Hall, E., T. A System for the Notation of Proxemic Behavior. *American Anthropologist,* 65(5): 1003–1026. 1963.

26. Herder, E., Mayer, M., Obendorf, H., Weinreich, Harald., Off the Beaten Tracks: Exploring Three Aspects of Web Navigation, Proc. WWW'06, ACM Press, 2006.

27. Hong, J. I., Jin, J., Won, S., Contextual web history: using visual and contextual cues to improve web browser history. *Proc* CHI '09. ACM, New York, NY, USA, 1457-1466. 2009.

28. Jackson, P. W., John Dewey and the Lessons of Art, Yale University Press. 1998.

29. Johnson, M., The Body in the Mind: The Bodily Basis of Meaning, Imagination, and Reason. University of Chicago Press, 1987.

30. Joshi, P., *Every Move you make, Google will be watching you,* Business Standard, March 21, 2009. Accessed 03/10/2013.

31. Laurel, B., Computers as Theatre, Addison-Wesley, 1991.

32. MacIntyre, A., After Virtue, Duckworth, 1982.

33. Madrigal, A. C, I'm being followed: *How Google – and 104 other companies – Are Tracking me on the Web*,  The Atlantic, Feb. 29, 2012. Accessed 03/10/2013.

34. Maes, P., Wexelblat, A., Footprints: History-Rich Tools for Information Foraging, Proc. CHI'99 ACM Press, pp. 270-277. 1999.

35. Mateas, M., Stern, A. Interaction and Narrative, PhD

Dissertation, 2002.

36. McCarthy, J., Wright, P., Technology As Experience, MIT Press, 2007.

37. McInnes, A., Assess the Effectiveness of Your Customer Journey Map, Forrester Research 2010.

38. Nardi, B. A., The Use of Scenarios in Design, SIGCHI Bulletin, 1992, Vol. 24, No. 4

39. Nason-Clark, N., Nietz, M., J., Eds. Feminist Narratives and the Sociology of Religion, AltaMira Press, 2001.

40. Osberg, K. M., *Constructivism in practice: the case for meaning-making in the virtual world,* University of Washington, 1997

41. Polkinghorne, D. E., Narrative Knowing and the Human Sciences, State University if New York Press, 1988.

42. Rieman, J., The diary study: a workplace-oriented research tool to guide laboratory efforts. *Proc. INTERACT '93 & CHI '93 ACM,* USA, 321-326. 1993.

43. Rogers, Y., HCI Theory: Classical, Modern, and Contemporary, Synthesis Lectures on Human-Centered Informatics, Series Ed John M. Carroll, Morgan and Claypool Publishers, 2012.

44. Sacks, O., The Man Who Mistook His Wife For A Hat, Duckworth, 1985.

45. Schechtman, M., The Constitution of Selves, Cornell University Press, 1997.

46. Strawson, G., Against Narrativity, Real Materialism and Other Essays, Clarendon Press, 2008.

47. http://www.nngroup.com/articles/how-long-do-users-stay-on-web-pages/ accessed 03/01/2014

48.https://docs.google.com/spreadsheet/pub?key=0AuZLaKQQs5x pdGdJNFZEdHhLUXJLa240WmsyZmFWbFE&output=html accessed 03/01/2014

49. http://www.nytimes.com/2012/03/01/technology/impatient-web-users-flee-slow-loading-sites.html?pagewanted=all accessed 03/01/2014

50. https://chrome.google.com/webstore/detail/history-timeline/gjhpcfomcckgcaniehfgakaddjgncpeb?hl=en accessed 06/01/2013

51. http://browseback.en.softonic.com/mac accessed 06/01/2013

52 http://www.mindretrieve.net/ accessed 06/01/2013