DIGITAL HUMANITIES: WHY WORRY ABOUT READING?

Terje Hillesund

Introduction

To state that "reading is at the heart of the humanities" may seem a perfect truism. However, if reading so indisputably constitutes a core activity in philosophy, literature and other fields in the humanities, it might have been expected that reading presented itself as a central area of research in the digital humanities, in which computers are extensively used for analysing and reading text. Curiously, the emergence of a new digital reading paradigm is not an issue in the digital humanities.

On the contrary, critical interest in digital reading seems to have diminished. In the 1990s the focus was on digital remediation of text[1] and hypertext[2] and, according to Claire Warwick, "many humanities scholars expressed excitement about the possibilities of electronic text, predicting that the experience of reading would change fundamentally."[3] Despite predictions in the first half of the 1990s of great changes in scholarly reading, she observes that in "the last fifteen years critical interest within humanities circles with respect to reading has waned and little progress has been made in understanding how electronic textuality may affect reading practices, both of academic and non-academic readers."

While one might suspect Warwick of slight exaggeration, or underestimation, an examination of the Digital Humanities conference programmes over the last years shows that very few papers specifically deal with reading, let alone the diversification of reading resulting from the evolution of digital texts. Nor does *A Companion to Digital Humanities* have chapters specifically on the actual uses of humanities Web sites.[4] The *Companion* deals with many aspects of humanities computing, including text encoding, electronic scholarly editing, textual analysis, archiving and preservation, in archaeology, history, linguistics, literary studies and music, but the focus is clearly on production rather than dissemination and reception. A little better off is *A Companion to Digital Literary Studies*, with several theoretical articles on reading, mostly of hypertext literature.[5] In *Scholarship in the Digital Age*, which includes critical editing, digital libraries and scholarly publishing, Christine L. Borgman uses very little space on end-users and their reading of digital scholarly publications. On the issue of online scholarship, Borgman maintains that: "An initial question in constructing a [digital] scholarly infrastructure is what to build when we know so little about how it will be used."[6]

In a self-reflective paper, Peter Robinson – on behalf of digital editorial philology

– ponders the slow changeover from printed critical editions to digital text editions,[7] and similarly Patric Juola examines how "the emerging discipline of 'digital humanities' has been plagued by a perceived neglect on the part of the broader humanities community."[8] As John Bradley points out, only a small percentage of humanist scholars "go beyond general purpose information technology and use digital resources and more complex digital tools in their scholarship."[9]

For this situation to improve, Robinson and Juola call for new tools and killer applications; Robinson for collation tools and Juola tools for index generation, resource exploration and collaborative research. However, their analysis is primarily done from the editors' perspective and, as Lisa R. Schiff emphasises, in addition to addressing the problems involved in producing digital critical editions, a major area of concern must be the feasibility of such works on the part of the general scholar and lay researcher.[10] In line with Schiff's view, Warwick and her colleagues claim it is incumbent for producers of digital resources to understand the working practices of the scholars for whom they design, and Bradley suggests that tool builders in the digital humanities would have greater success persuading their non-digital colleagues if the digital tools were more in line with the ways in which humanities scholarship is generally conducted.[11]

In different ways, Schiff, Warwick, Bradley and Borgman call for more "use-inspired basic research."[12] This paper will present results from such a user-oriented study. By focusing on text materiality and physical aspects of reading, the study examines working habits among humanist scholars, trying to discern challenges in transferring sustained reading of long-form text on to a digital platform. First, however, a short presentation of theories on reading will indicate that much research relevant to user issues is actually taking place. Considering the request for user studies, it is likely that perspectives from this research will soon pervade discussions in the digital humanities.

Research on reading

In Western research, the historical and geographical multiplicity of writing systems (clay, stones, parchment, Chinese characters, Korean hangul etc.) is often recognised. Nonetheless, reading is usually treated as interpretation of alphabetic text, including pattern recognition, decoding of letters and words, and – against the background of cultural understand-

ing – construing of lower level interpretations into meanings at increasingly higher levels.[13] Even if reading for literate people is automated, it is a very complex activity, comprising the physical text and its context, as well as the use of hands, eyes and brain.

In neuroscience, much research is done in order to determine what parts of the brain are involved and how it works when we are reading.[14] The partly linear and saccadic eye movements during reading have been thoroughly traced,[15] and combined with centuries of typographical experience this has given a good idea of how to ensure readability and how to present text in order to support fluent reading of lengthy texts.[16] In literacy studies, scholars have described the variety of text media, the history and sociology of reading, and the global spread of literacy.[17] Literary studies, especially post-structuralism and reader-response theory, have contributed multiple theories of text interpretation, focusing on the active role of the reader.[18] Hypertext theorists have called attention to the distinctiveness of multi-linear and interactive reading[19] and, as a recent development; social semiotic researchers have started examining the reception and interpretation of multimodal texts.[20] In the history of books, researchers have shown growing interest in the correlations between the materiality of texts and distinct ways of reading.[21]

Current research on reading is immense, and the number of studies on professional journal reading alone is probably in the thousands.[22] Practically unnoticed by humanist scholars, large amounts of empirical research have also been done specifically on digital reading, often comparing onscreen reading to paper reading. Mainstream research on digital reading is measuring legibility and comprehension of texts presented on stationary computer displays,[23] on handhelds[24] or on electronic paper,[25] and preferences regarding paper and screen reading,[26] reading of e-books[27] and user behaviour in digital environments.[28]

As this account should indicate, reading is a phenomenon studied within several rather separated fields. Thus, in reading research there is a profusion of perspectives and a multitude of models, with long-lasting oppositions between a constructivist and a dense processing view[29] and between reader-oriented and text-oriented perspectives.[30] Despite differences, in most traditional research there has been a tendency to treat reading in a rather abstract way, as if all reading were more or less the same – a silent and inwardly individual act of interpretation. Similarly, text is often abstractly assessed, presumed to be a plain long-form text.

Reading, body and the materiality of text

It is probably fair to say that reading research has a strong focus on visual perception and the cognitive aspects of reading, that is, on reading as a mental activity, sometimes with an emphasis on sociocultural bearings on this activity. Until recently, little attention has been paid to bodily aspects of reading, or to the fact that reading involves the physical handling of books, computers and other reading media. However, a growing number of theorists refer to Roger Chartier, who has emphasised the significance of text materiality and corporal aspects of reading. In his treatment of text interpretation and meaning making, Chartier argues that the same text apprehended through a different mechanism of representation is no longer the same.[31]

Chartier points to several historical developments that are pivotal for reading practices and experiences.[32] First, and extremely important, was the implementation of the codex in the second and third centuries. Gradually replacing the scroll, codices gave new and more effective ways of organising, accessing and navigating text. However, the early reading of heavy and densely written parchment codices (with many abbreviations and no word spacing) required the service of more or less the whole body, including the voice. Then, during the Middle Ages, the introduction of smaller books and new text features, such as word spacing, punctuation and paragraphs, made reading easier and more fluent.[33] This development led to a consequential shift from oral reading, indispensable for comprehension, to reading that could be visual, silent and fast.[34] The printing press provided new ways of reproducing text, made books even more legible and accelerated the spread of literacy, having a profound cultural and social significance.

In his theoretical outline of a history of reading, Robert Darnton underscores the significance of text materiality for reading practices,[35] and Alberto Manuel's copious *A History of Reading* is very much a description of codices, printed books and other technologies related to reading.[36] In the field of material studies, Mary and Richard Rouse and Paul Saenger have shown that the advancement of the codex to an easily navigable book was a very long process indeed, a process that only accelerated in the 13th century when manuscripts were provided with pagination, indices and concordances.[37] For Peter Stallybrass, the art of printing is primarily a culmination in the development of the navigable book.[38] In printed books, accessibility was further improved by a more systematic provision of titles, chapters, tables of contents, page numbering, headers

and footers, assisting fingers and eyes in browsing and navigation. Stallybrass shows that printed Bibles in 16th century England were designed to support discontinuous reading, with indices and concordance lists supporting Protestant interpretations of the scripture. Through studies of contemporary book annotations and diaries, Stallybrass documents that the Bible was in fact read discontinuously. That reading at a later stage, in the 18th and 19th centuries, was to be dominated by silent and continuous reading of books, especially novels, can according to Stallybrass be seen as a return to an earlier form of reading: "To imagine continuous reading as the norm in reading a book is radically reactionary: it is to read the book as if it was a scroll."[39]

In his analysis, Stallybrass emphasises the continuation and amplification of codex features in the computer and on the Web. In a digital environment many typographical features are the same as before; access to pages is simple, book marking is easy, and advanced search functions make it possible for readers to follow up on themes in a discontinuous reading process, jumping from page to page and site to site. However, while Stallybrass accentuates continuity, Chartier focuses on the break, claiming that the new "immaterial" materially of digital text inevitably requires new ways of reading.[40]

Among researchers studying current changes, semioticians are particularly preoccupied with materiality of semiotic resources. Since the 1970s and 80s, desktop publishing and offset printing techniques have dominated composition and printing, making use of photo and graphic illustrations far less complicated. Today newspapers, magazines, textbooks and trade books are often sophisticated publications in which much of the information is provided by visual means. Researchers such as Gunther Kress and Theo van Leeuwen,[41] have described the visual grammar of multimodal texts, and they have suggested that multimodal reading is not primarily a continuous or discontinuous reading of verbal text, but rather a composite kind of reading in which attention jumps back and forth between illustrations and text. Researchers encounter great challenges in trying to explain how meaning is construed in multimodal reading.

Among hypertext researchers, George Landow and Jay Bolter are technologically very explicit.[42] They have examined how the computer alters the materiality of text, the physical handling of text and ultimately the reading of text. Having little of the tactile materiality of printed text, digital text is a volatile virtual image of an electronically stored text. Thus, digital texts are highly editable, extremely moveable and through the linking system of the Web, globally accessible. The links on the

Web and in hypertext literature provide readers with multiple choices; by clicking the mouse, users can choose their own reading paths. Digital reading is thus multi-linear and discontinuous. In a Web environment, text boundaries are not obvious; in a sense the entire Web is one enormous, interconnected text.

While hypertext theorists celebrate a new-won freedom for readers (and writers), others claim that the current shaping of the Web induces a new form of constraint; a psychological urge to click. Asserting that different kinds of materiality impact our reading, Anne Mangen examines the impact of the intangibility and volatility of digital text on the reading process, which she claims is dominated by shallow forms of reading, such as scanning and skimming.[43] Taking as a basis Merleau-Ponty's phenomenological concept of humans as bodies-in-the-world and William Thorngate's psychological theories of attention, Mangen argues the near impossibility of getting immersed in hypertext or online reading in the same way we get lost in a book. Most websites provide an abundance of attention-switching possibilities and promise new stimuli in the form of links, pictures and videos. As a rule, then, when we have options to easily rekindle our attention through outside stimuli, we are – psychobiologically as well as phenomenologically – inclined to resort to them, rather than try to resist such distractions by attempting to structure consciousness from within, and thus continue reading.[44] In front of the computer screen – and especially online – we are tuned in to change; we expect something to happen, and are thus compelled by a powerful urge to click.

Many studies support Mangen's description of online reader behaviour as dominated by shallow reading. Ziming Liu has reviewed the research on digital reading and, backed up by own research, concludes that: "Screen-based reading behaviour is characterised by more time spent on browsing and scanning, keyword spotting, one-time reading, non-linear reading, and reading more selectively, while less time is spent on in-depth reading and concentrated reading."[45] Liu notes decreased sustained attention, and his results have been confirmed by research at University College London.[46] In a series of articles, David Nicholas, Ian Rowlands and associates describe viewing and reading habits among academics visiting digital journal libraries. Even if the picture is varied, most of the library viewing is cursory in nature, described as "bouncing;" a pattern of behaviour whereby a high proportion of users view only a few Web pages from the vast numbers available and then never return to the site. Some click forward from lists and abstracts to full-text view-

ing of articles, but as the studies show: two thirds of article views lasted less than three minutes and 40 per cent were completed in a minute or less.[47] This viewing and bouncing behaviour is called "squirreling" – an energetic search for treasures that are downloaded for later consumption. Scholars seldom read the same text online for a long period of time: from undergraduates to professors, the pattern of behaviour in digital libraries is characterised by Nicholas and Rowlands as "power browsing."

The UCL projects do not tell us what scholars eventually do with downloaded papers and articles. Many are no doubt forgotten, but some are obviously read. According to Liu, research confirms the general belief that a majority of users often print out electronic documents for reading, and that the traditional habit of highlighting and annotating texts has not migrated to the digital environment.[48] The latter was also a major finding in the studies of Abigail Sellen and Richard Harper, who in an extensive research project studied paper and computers and their different uses in various organisations.[49]

Sellen and Harper's studies show that the computer system is superior in the actual making and remaking of documents, in storing, accessing and retrieving documents, and in facilitating the distribution of documents.[50] Paper, on the other hand, is used in many creative tasks such as editing, commenting and collaboration on text, and in tasks that require certain levels of sustained concentration, such as reading, in which annotation, quick navigation and spatial layout of documents allow readers to deepen their understanding of the text and create a plan for their own writing. Thus, even if the computer is the main tool in writing, paper reading is an important part of most writing processes, resulting in piles of books and print-outs surrounding the writer and the computer. Some of these books and papers are "hot" and spread out within reach for immediate use; others are "warm" and piled up for later or potential use. At some point, documents become "cold" and are removed from the desk.

In her article, Mangen underscores the sensor-motor dominance of the tactile in reading and examines the interplay between the body and the materiality of text. Sellen and Harper's research richly illustrates different ways in which reading actively brings the body into play and how reading is inscribed in space and time. They also clearly demonstrate how deeply embedded most reading is in practice; reading is an integral and essential part of a multitude of tasks and activities, including – obviously – scholarly study and research.

Research questions and method

Mangen's and Sellen and Harper's perspectives are exactly the focus of a study on reading which I carried out among humanist scholars in the spring of 2009. In 14 semi-structured qualitative interviews 10 participants (all established academics) were asked questions on their reading: how and where is it done, how they sit when reading and how they use their hands and fingers. The participants were asked about their note-taking and underlining, and whether their reading was continuous or done in parts, following links or linear, embedded in scholarly practices or part of ongoing communicative acts. In short: the corporal, material and contextual aspects of their reading.

A more elaborate account of method, research problems and results is provided elsewhere.[51] However, as in much hermeneutic phenomenological research, data in the study include information gathered from participants through interviews, from results of other researchers, as well as the researcher's personal reflections based on the very important first-person experience.[52] Thus, in addition to being built on findings from the interviews, the following description of reading is to some extent influenced by my own experience and to a large extent by the experience of other researchers, many of which are mentioned above.

Aspects of scholarly reading

Concepts

In order to trace and describe corporal and material aspects of reading, both data and concepts are needed. In this study, the concepts used to analyse reading are not entirely theoretical, but rather moulded and shaped by empirical findings in an ongoing hermeneutical process. The aim of the study is not to provide statistical evidence on academic reading behaviour, but to disclose and analytically describe basic features of this reading. Hopefully, the discussion will clarify some of the many fuzzy concepts characterising the debate on digital reading. What do we actually mean by deep reading, sustained or discontinuous reading?

The discontinuousness of academic reading

It is a fact that text is laid out in space and read in time, and that text always deals with some kind of subject matter. On the basis of these fundamental characteristics, reading can be described by degrees of con-

tinuousness, including temporal and spatial continuousness, and thematic connectedness.

Time spent on an act of reading varies dramatically, from very short acts of reading text messages or e-mails to lengthy periods of reading magazines and books, which can go on – more or less undisturbed – for hours. There are obviously all kinds of reading spans in between, but usually the uninterrupted reading of a magazine or journal article is considered a long read and an example of continuous reading – in a temporal sense. Reading that is repeatedly interrupted by other engagements is thus discontinuous.

However, the concepts of continuous and discontinuous reading are ambiguous and often used in a spatial rather than temporal meaning. Spatial continuous reading is reading that follows the linear and sequential order in which a text is presented, such as the normal way of reading a novel. Usually it starts at the beginning, and the reading has to cover a certain amount of text (last for a minimum of time) to be labelled continuous. Discontinuous reading is reading out of order, so to speak, in which the reader jumps back and forth in a text, reading parts of a book or an article without following the linear and sequential order of its presentation. Reading a succession of very short texts or parts of texts is also a form of discontinuous reading, common when browsing the Web or scanning printed newspapers. Discontinuous reading of multiple texts of disconnected subject matter is called fragmented reading.

A combination of discontinuous and continuous reading is frequent when flicking through newspapers or browsing the Web, intermittently slowing down to continuously read an article or two. Combined, as well as purely discontinuous reading, can go on for a long time and, in a temporal sense, be continuous. However, to call the same reading session both continuous and discontinuous is awkward; in the following I will call all kinds of lengthy acts of reading sustained reading.

Sustained discontinuous reading seems to be characteristic of scholarly reading. One of the participants in the study, "George," says that when he receives presumably interesting material, such as a printed book, he starts by carefully reading the table of contents and then part of the introduction to see if the book interests him. If it does, he flicks through the pages scanning for keywords and skimming small bits of text, trying to get a better feeling of the overall structure and style. He then studies the bibliography and, using the index, he finds two or three places that seem particularly promising. If these passages are of interest, he reads the adjacent subchapters or chapters, and usually this is what he reads in

a book. However, sometimes he expands the reading and, in rare cases, he reads the whole book.

"Jane" tells a very similar story, only that when she starts reading at a promising spot, she takes notes on a piece of paper. Using subtitles, she makes a rough outline of the chapter in question, and when reading she takes notes in order to discern the line of argument and the ways of combining ideas. However, both "George" and "Jane" are willing to abandon reading at every point in the process. "Jane" says she stops reading if the text is too unfamiliar or difficult, or if it in any way is irrelevant for her present research. However, if she feels compelled to do so, she sometimes intensifies the note-taking, using all kinds of resources in her office to complement the reading; reference books, scholarly works, and online resources.

Stories of article reading are not dissimilar to those of reading books. "Carl" says he usually skips the abstract of an article and goes straight to the introduction, reading some paragraphs to get an idea of the research problem and theoretical standpoints. If it is interesting, he jumps to the conclusion and then he studies the empirical findings, flicking back and forth. This, he says, gives him enough understanding and usually renders reading the rest of the article unnecessary, at least for the moment. However, some articles he starts re-reading from beginning to end, always underling and making notes. Sometimes he reads an article or a book several times, and "Susan," during her interview, showed a heavily underlined and annotated paper she had read several times in order to use theoretical points in her writing. However, the annotations stopped mid-way in the article, and asking her why, she said that the last part presented empirical findings, which did not interest her. Asking her if she had read it, she said no.

Discontinuous and notoriously treacherous reading thus constitutes a distinctive scholarly reading characteristic. Yet, as indicated, continuous reading of book chapters and articles is not uncommon as part of the overall study of a subject. But continuous reading of whole books also occurs, often as complementary reading on subjects adjacent to the main focus of interest. "Carl" speaks of "scholarly reading for pleasure" which is continuous reading of non-fiction books rather similar to the continuous reading of novels. In the study, the participants unanimously said that they read novels continuously, if not always to the end.

All the reading commented on so far has been reading of printed books or print-outs. While research confirms that reading of scholarly articles and books is still dominated by paper,[53] some research may indicate that sustained screen reading is increasing.[54] Several of the participants in

the study reported that they sometimes read articles onscreen and even online, although their onscreen reading is not particularly conscientious and is usually for the sake of overview, typically without note-taking and often terminated before the end. "George" commented that the more relevant the article, the higher its chances of being read on paper.

Online scholarly reading is definitely discontinuous and often fragmented in character. Participants reported that they often browse the Web and scanned pages in search of information and updating, some frequently re-visiting favourite sites and blogs. Some also browse the cultural sections of online newspapers such as *Le Monde* or the *New York Times*. Occasionally, browsing leads to continuous reading of one or two articles, and more or less always to the following of links in a process that, according to one participant, "can go on forever." When following links in a random way, informers often get led astray; but then fortuitous surfing also leads to discoveries of new and interesting sites.

The Web is also habitually used to search for specific authors or subjects, using search facilities such as Google, Google Scholar and sometimes databases offered by the university, mostly the national library search catalogue and international portals, such as Ebsco and FirstSearch. Participants also use online dictionaries and encyclopaedias, such as the Oxford English Dictionary and Wikipedia. The Web is sometimes used in collecting data from statistic databases, manuscript databases and newspaper collections. Obviously, the way these resources are used varies considerably among the participants. The point here is that all these scholarly uses of the Web are associated with discontinuous reading aimed at finding, scanning and delivering text.

Immersive reading

When analysing the power browsing behaviour of academics in digital libraries, the UCL researchers characterise the reading as shallow, presumably in contrast to a more deep involvement with text.[55] The shallow-deep contrast, however, is not always a very clarifying dichotomy. When "Adam" searches for full-text literature in journal portals and gets interesting hits, he examines many potentially relevant articles, skimming abstracts, looking at keywords, studying reference lists and reading introductory parts of the articles. Many articles are discarded as irrelevant. Some are downloaded and stored. Of these, a few are printed out on paper and read, either immediately or at a later stage. Adam's way of reading online may seem superficial, but is actually the first step in an exhaustive in-depth reading of selected articles.

Even if it is sometimes difficult to determine what acts of reading are shallow or deep, it is nevertheless a common experience that reading does have different levels of involvement, indicated by the many words for reading: to leaf, flick or thumb through, to look over, to browse and skim, to study, scrutinise and peruse, to decipher and interpret. Marie-Laure Ryan has examined the many metaphors used in describing engaged reading, usually associated with movement, saturation and depth, often in combinations.[56] We talk of being carried away or lost in reading, being deeply involved or immersed, deeply absorbed or engrossed in reading. Based on Ryan and participant stories, it would seem that engaged humanist scholarly reading can be described as comprising two major types: imaginary and reflected reading.

In immersive imaginary reading, readers get involved in a story, conjuring up vivid images of persons and places; living through situations, empathising with characters. Readers are carried away into imagined worlds, anxious to know what is going to happen. Despite being absorbed in a book, "Carl" claims that simultaneously he has an eye and an ear for literary qualities. For him, becoming immersed in reading is emotionally satisfying, and "Adam" said that he consciously uses novel reading as a form of escape. "Silvio," a literary critic, claimed that absorbed literary reading is an ultimate goal he seldom experiences, due to the analytic and evaluative character of his interpretations. Immersive imaginary reading is often associated with narratives and requires reading to be fairly fluent.

In immersive reflective reading, readers get involved in argumentative texts, eager to understand, interpret and learn, to see connections and consequences, and to widen their understanding. "Carl" compares the satisfaction offered by reflective and imaginary immersion, saying both experiences produce a place where he wants to be: in absorbed reflective reading he is away in a theoretical world, but recognisable insights makes him feel at home. "Jane" says that to be really engaged in a scholarly text, it has to be familiar, yet challenging. As with imaginary immersion, reflective immersion requires reading to be fluent. As indicated by neurologists, fluency has automated basic reading operations in the brain, adding time for inferences, thus facilitating thinking that goes beyond the text.[57]

All readers feel that text involvement is relative, that immersion is a matter of degree. Sometimes readers get tired or hungry and drop out; at other times readers find a text difficult, uninteresting or downright boring. Moreover, the imaginary-reflective distinction is not particularly clear. Rather than inducing imaginary immersion, much fictional

literature, both classical and modern, requires a high degree of reflection in order to make sense and arouse interest. Regardless of this, both imaginary and reflective engagement is sometimes called hermeneutic immersion, a term based on Don Ihde's concept of a hermeneutic relation between users and technology, in this case between reader and book.[58] According to Ihde, there are three basic human-technology relations.[59] In embodiment relations, the tool functions as an extension of body and senses, such as an axe or a pair of glasses. In a hermeneutic relation, the instrument tells the user of conditions somewhere else, such as a map or a book describing the coming of Homo sapiens. In the hermeneutic relation, attention is towards technology as an object of perception; however, through interpretation of signs, the user becomes conscious of circumstances elsewhere, and this virtual world becomes the primary focus of attention. In alterity relations, the user's focus is very much on technology itself, often as an object of fascination.

A requirement for hermeneutic immersion is that the technology offers minimal disturbances on the part of the user; that it becomes more or less transparent. Over the centuries, typographers have refined the design of books, making the printed book an effective reading technology. In books, facing pages are important composing units, and typographers' knowledge of fonts, lines, whitespace and margins has been extremely beneficial for readers. Many books and printed publications are very well suited both for continuous and discontinuous reading, and for imaginary as well as reflective immersion.

Over the last decades, much traditional typographical knowledge has been transferred into word processors and desktop publishing software, making pre-press production of printed publications digital. Software applications also make it relatively easy for laymen to produce highly readable print-outs. Dedicated reading software, such as "Mobipocket" and "Microsoft Reader," also utilises time-honoured typographical features to some extent. The ordinary computer screen, however, is far less suited than paper to creating optimal reading conditions. This is partly due to technological limitations, such as low resolution, tiring backlight, widescreen formats and the stationary position of the screen, which in sum makes reading tiring. In addition, most reading software is designed with toolbars, side panels and icons, and the applications are often placed within the interface of a web browser or an operating system, with their own toolbars and icons. Thus, with numerous eye-catching elements within the visual field, all offering actions to the user, there is a considerable potential for fluency disruptions intruding on text immersion. In the

study, "George" said he frequently reads e-books using Adobe Reader, however, when asked further, it boiled down to reading of two classics on the laptop at home in his sofa, an implement he held to be quite all right. Without actually being able to explain why, participants in the study generally complained at the laborious experience of sustained on-screen reading, even with specialised software.

Quite different then, is the new generation of devices based on electronic paper, such as the Amazon Kindle and Sony Reader, specifically designed for reading. Even if they introduce new obstacles, such as slow paging, in these devices backlight, resolution and immobility are no longer issues. Weight, format and typography make them well suited for continuous reading of fiction and non-fiction. "Adam," who owns an Amazon Kindle and a Cybook and reads e-books on a daily basis, claims that electronic paper is very good for reading novels. After a very short time, he claims, the device becomes transparent and the story springs forth. His enthusiasm notwithstanding, "Adam" describes at length the lack of annotation possibilities and poor navigational aids, arguing strongly that e-paper devices, as yet, are not suited for the exhaustive ways of reading in study and research.

In the study, "Adam" was the only participant with e-paper experience, but his account is in close accordance with my own experience, and also in line with research. Ergonomic evaluations reveal that, from a technical point of view, in readability, current e-paper displays are good enough to compete with ordinary office paper; they only need slightly greater illumination.[60] When the groups in a Texas A&M study had used the Amazon Kindle for a month, around half the participants were still, to various degrees, conscious of the physical device when reading; some were distracted by the clicking of the next page button and the time lag in paging. The other half had become accustomed to the device, saying that it eventually faded into the background. Nevertheless, many participants wished for improved navigation and better bookmarking and annotation features.[61] A Princeton report[62] and several other studies confirm that students regard the Kindle device as better suited for leisure reading than reading for study and research.[63]

Among digital formats, Web browsers are probably the least suited for immersive reading. As pointed to, the Web has its strength in reading activities related to searching and browsing, uses of dictionaries, encyclopaedias and databases. The Internet and the Web are unrivalled in disseminating and accessing information and have facilitated a range of new communicative forms such as e-mail, discussion groups, chat

and net communities, all of which entail reading, usually in a rather fragmented form. In addition, of course, the Web is effective in disseminating and sharing music, videos and movies. According to Ryen and Mangen,[64] computers have their own specific form of immersion. It is very common to be caught up in front of the computer screen, deeply engrossed in browsing, chatting, socialising or gaming, as some participants reported. Nevertheless, online immersion is very different from the hermeneutic immersion of reading. In imaginary and reflective reading, the text is fixed and the signs arbitrary; meaning is created by internal processes in the user's mind. By contrast, online immersion is the result of external stimuli and the user's manipulation of the computer (using mouse, keyboard or joystick) in response to the flow of pictures, animations, videos, and text snippets. Much of the fascination lies in the ability to affect the outcome of the "game."

Obviously, computer technology has facilitated a wealth of possibilities in the calculation, manipulation and presentation of data, in receiving immediate input and in cyber socialising. However, technological features that are powerful in some domains may be weaknesses in others. As I will examine further, from the point of view of reading it seems that hypertext, multimodality and the multi-functionality of the Web are incompatible with sustained reflective and imaginary reading, and thus with hermeneutic immersion.

Multimodal reading, hypertext and activity: the urge to click

Multimodality is not a new phenomenon. Illuminated manuscripts and illustrated books have a long history and, as Kress and van Leeuwen point out, the use of graphs, diagrams, maps, models, drawings and photographs often increases the informational and aesthetic value of print publications.[65] In addition, a heavily illustrated magazine or textbook offers the user several choices. The reader can look at pictures and the accompanying captions and titles and form a good idea of what the article is about. Parallel to this, the background information and explanations of the main text can be read to get the full story. Either way, due to inclinations in our perception and the salience of pictures, the eyes will jump back and forth between text and illustrations. Direct visual perceptions will complement or replace the mental images usually produced during reading. In a spatial sense, strictly verbal reading will thus be discontinuous. Multimodal reading, on the other hand, will in a temporal sense go on uninterrupted; the reader will construe visual-verbal meaning units not reducible to any of the two modalities. As the

use of illustrations increases, however, a visual logic will eventually take precedence and dominate, as is the case with many modern magazines and text-books. In publications of this kind, verbal text plays an auxiliary or reciprocal role, anchoring and contextualising pictures. For readers, the meaning is derived from self-sufficient visual-verbal entities dominated by images, and the process of reading inevitably changes as the reader starts looking and flicking.

By contrast, non-illustrated printed texts offer no option but to read. Moreover, many text genres imply an intended reading order. In the eyes of hypertext theoreticians, especially Landow, these features represent limitations and impose constraints on the reader, keeping the author in control.[66] However, with particular reference to reading of scholarly articles and books, this study shows the opposite to be true. In academic genres, the strict structural order of texts seems to offers readers a high degree of freedom in choosing their own reading paths: Always indicating where you are, a tight structure allows for jumping, skimming and discontinuous reading, still making good sense of the text. On the other hand, hypertext theoreticians obviously have a point; hypertext literature and the Web do offer the user a wealth of opportunities. Yet, from the point of view of sustained reading, this hypertext freedom seems to come at a high price.

As David Miall and Theresa Dobson report, evidence from empirical studies suggests that certain aspects of hypertext, such as links and image hotspots, may disrupt reading.[67] In a study of readers who read either a simulated literary hypertext or the same text in linear form, they found a range of significant differences suggesting that "hypertext discourages the absorbed and reflective mode that characterises literary reading." The Web, since its introduction in the early 1990s, has developed from being as system for linking plain text documents, to be an exceedingly multimodal hypertext, including graphics, pictures, sound, video and animations, as well as interactive and communicative features, such as games and chat, and net societies, more or less combining it all. Needless to say, in this highly audiovisual and communicative universe, solitary sustained reading of long-form text is on the defensive. On the Web, most users are tuned in to everything but reading.

Even rather straightforward Web pages have moved far away from time-tested typographical principles applied in publications meant for sustained reading. When "Adam" illustrates how he reads a Norwegian research site, he at first claims to be very good at focusing his attention on the content section of the page, turning a blind eye to the surrounding

columns with their ads and links. However, when asked why he initially scrolled down a bit, he said it was to get away from the top advertisements and the title head, both being a nuisance. And while he is at it, he says that he sometimes scrolls sideways to get away from the vertical ads, and he ends up with a long anti-ad harangue. When referring to one of the ads depicting Charles Darwin in one of the right columns and asking if he had noticed it, he said that it been there for weeks and that he had actually clicked on it a couple of times to see what it was.

In the interview, "Adam" continued by browsing one of the quality Norwegian online newspapers. When asked to say what he was looking at, he said he went straight for the titles and text and was less interested in the pictures, which he hardly noticed. However, when changing to *The Guardian*, there was a long silence as he studied the front Web page. "Here it takes more time," he said. "The news area is plain text and I have to start reading to detect what the articles are about. *The Guardian* is different from the Norwegian papers in which the pictures give a pretty good idea of what the stories are all about," he said. When asked if he actually did look at the pictures, he said: "Well, yes, I suppose I do."

As mentioned earlier, a Web page is presented within a browser within an operating system, all with their tool bars and icons. The pages usually have headers and footers and several columns and both graphics and pictures. Salient visual elements necessarily make the reading multimodal and qualitatively different from linear reading of plain text. In addition, pictures and animations are often part of the linking system of the Web pages, making stirring hotspots adding to the psychological and bodily urge to click, as described by Mangen.[68]

As for the urge to click, "Adam's" story indicates that it is psychologically very hard to fight off distractions and alluring links even when reading interesting subject matter. Still on *The Guardian* site, he illustrates how he sometimes barely skims the first part of an article and only starts reading seriously when he has scrolled past the links and ads to the page area where text is the sole element. However, at this point in the interview he picks up his iPhone, saying that he actually prefers to read lengthy news articles and comments on that device. Even if the display is rather small, it is clear and when reading, text is the only thing occupying the visual area – there are no distractions. Unsolicited, he enthusiastically starts relating how he can sit at home, feet high, enjoying reading the long, informative articles in *New York Times* on his iPhone. He also says he reads e-books on the iPhone, and that e-books on iPhone and Amazon Kindle are somehow synchronised. Related to Mangen's reasoning on

text materiality and reading, "Adam's" stories suggest that it is not the intangibility of digital text as such that prevents hermeneutic immersion, but rather the prevalent hypertextual and multimodal manner of its presentation.

Adam's story about home reading also points to a very important contextual factor. For academics, the computer is a multi-functional working tool and, as some participants pointed to, extremely demanding. Participants said they often felt obliged to start the day checking their e-mails, answering some of the messages or responding to others, for instance by starting to prepare an upcoming meeting. While checking, one might also open the learning management system to see if more students have submitted their obligatory papers and then suddenly remember those unfinished Power Points. Several participants had data or texts that needed further analysis – and then there is the writing. All participants were working on at least one unfinished manuscript for a journal article or a book. Thus, with its strategic location, the computer is a constant reminder of things undone. Taken together, all these factors – ergonomics, multi-functionality, multimodality and hypertext – make it extremely hard to maintain an act of digital reading for a substantial period of time.

Bodily aspects of reading

In the study, the participants were very conscious of the obligations and allurements of the computer and, preferring paper, all had in different ways developed strategies to avoid being distracted or tempted by the screen while reading, usually positioning their body so as not to stare directly into the beckoning display. Some participants simply turned their back on the computer, using another part of the desk. "Carl" had cleared a well-lit corner of his office couch, and "Eric" said he sometimes found a quiet spot in the canteen to get things read. All said they often read at home.

While reading, the participants use their hands very actively to hold the book or print-out in the visual focal area, flicking back and forth in a discontinuous way of reading, as previously described. In addition, especially with print-outs, the participants hold a pen, pencil or highlighter in their hand. Using rather different systems, they underline, highlight and make carets or exclamation marks, lines or squiggles, notes or comments, in the margins or around the text. "Carl" said he felt uneasy without a pencil in his hand, and "Susan" said she always operated a highlighter, using it like a weapon to help her concentrate and hunt for important pas-

sages. Among the participant, several said that the use of hands, fingers and pen or pencil was an indispensable part of their scholarly reading.

The annotation and marking tools were mainly used by the participants for two interrelated purposes: to improve comprehension of the text and to render visible relevant connections to their own writing. The highlighting and note-taking helps slow down the pace of reading and often leads to re-reading of passages and recording of points. From the point of view of cognitive psychology, the annotation habit is probably a way of processing information, giving it time to fit into schemas in the long-term memory and also providing time and space for reflection and the discovery of inferences. In addition to using words describing comprehension, such as understanding, insight and cohesion, the participants ended up saying that they very often related the underlining and annotating to their writing. Annotation is accordingly described as an aid to help find again important points or citations for use in their own articles and books. "Eric" is probably the participant most conscious of this instrumental aspect of reading, saying he never reads anything without connecting it to coming lectures or writings. For him, the obligatory annotation tool is used not so much for underling as for comment and relating observations in the text to thoughts of his own. "Eric" says that the most stimulating texts are those shedding new light on his own research problems and thus reaching beyond the text at hand.

As noted earlier, reading is a bodily and mental process evolving in time. When "Carl" meditates on the pleasures of reading, he recognises glimpses of insight as inherent in the process of reading, happening while reading and then quickly fading. To him, underlining and note-taking is a somewhat futile attempt to externalise these insights, making them visible and lasting, an endeavour which is only completed when his own writing is successful. "Carl" also tells an anecdote that lucidly illustrates the relations between body, materiality of text and ways of reading, especially through his use of metaphors. In the story he tries to uncover why he prefers paper to computer when engaging in an act of reading. Sometimes, he said, when working away from printers at his cottage, he urgently needs to read an article on his laptop. At one level this is unproblematic; he can read through the text, understanding every sentence and paragraph. At the same time, he often gets a feeling of not getting fully to grips with the text, that he somehow loses oversight and is unable to fence the article in, which is frustrating. When asked to expand on these utterances, he says that in order to see connections and make inferences when reading, he often needs to have several text passages or

ideas present simultaneously, and in printed versions the passages are physically there on the sheets of paper. He can flick back and forth, stick his finger in between sheets and keep several ideas in his memory at the same time: comparing, relating and thinking. On the laptop he is not able to do this; on screen, the text and the author slip through his fingers.

In the study, all participants reported digital scholarly reading to be more superficial than paper reading, with more skimming and less annotating. In paper reading, the participants very actively utilise the tangibility and physical shape of books and print-outs. The bundle of sheets, the solidified text and the over-writable paper make it easy to flick back and forth and use a pen in the typical discontinuous and annotating way of concentrated scholarly reading. By contrast, the digital nature of text and the use of the mouse and keyboard make computers very well suited for browsing, searching, accessing, downloading and skimming text, which is also what participants use the computer for. The participants' answers and "Carl's" story make a very good case for Mangen's claim that the intangibility and volatility of digital text make it hard to combine with immersive reading, at least with the scholarly form of immersive reflective reading.

Writing in reading

The briefly mentioned relationship between reading and writing points to another important dimension of reading: the degree to which reading is integrated in more comprehensive tasks. Sometimes, of course, reading is a stand-alone activity, done for its own sake, such as leisurely reading of novels. Often, however, reading is part of a wider activity, such as filling in a form, receiving an instruction or doing all kinds of administrative work. For scholars, reading text is an integral part of their work; they read to prepare lessons, to evaluate, to give assessments, to review, to correct and to comment – all activities with their own specific way of relating to the text. In the participants' research, texts are mainly read for three purposes: texts are the object of analysis, such as works of philosophy and literature; documents are the source of information and data, as in history and linguistics; and journal articles and monographs present theories and data relevant for the scholar's own research and writing.

An example of the first is "Johanna," who is writing a monograph on a minimalist author, studying the intertextuality in several novels. Even though she knew the author well, during research she repeatedly re-read the novels, first in a rather continuous way, mostly underlining, then more discontinuously and analytically, hunting for intertextual refer-

ences, citations and allusions, extensively taking notes and making comments. During the third re-read, she also followed up on the allusions and references, reading the referenced works along with scholarly literature on their authors, again taking notes and comparing her own findings with those of other researchers. All notes are handwritten; however, the specific writing of "Johanna's" book is done in Microsoft Word, and the notes, being spread around the computer, are constantly being consulted in the process of writing, the notes in fact being the groundwork upon which the monograph is built.

"Silvio" illustrates the second purpose. When "Silvio" was writing his author biography he travelled to libraries all over Scandinavia and Germany reading documents, old letters, journals and microfilm newspapers, transcribing, taking notes and sometimes (when allowed) copying documents. When circumstances forced him to write by hand, the notes were later entered into his laptop. These collected notes and data, the result of his reading, were indispensable in his later writing.

The third purpose is exemplified by the following. As pointed out, participants relate most of their academic reading directly to their writing and in this respect, the method of "George" is revealing. When writing a document, he creates a parallel document containing the outline of his work. When reading scholarly books and journal articles, he starts by underlining and making annotations in the margins and then later writes comments, citations and references into his parallel document for potential use in his own writing process.

Writing and the activity of research are thus very much ingrained in scholarly reading. Relevance for writing is what scholars look for when searching for literature, it decides what they download and it determines whether the text is actually printed out and studied. Their own research questions form the perspective used in interpreting and extracting meaning from the text, and future writing, finally, is what guides the hand, fingers and pen in highlighting and annotating while reading. In the end, the notes are used when writing.

Reading in writing

As writing is part of reading, so is reading part of writing. In the study, all participants were writing on a computer using a keyboard and screen, often producing text from notes and sometimes from handwritten rough drafts. When writing, the participants were all reading, yet in different ways. "Johanna" said she was reading the text as she was writing, more or less simultaneously, correcting errors and usage on screen as she went

along. "Silvio," on the other hand, was also simultaneously reading what he was writing, but he could write several paragraphs or subchapters before going back, re-reading and correcting the text.

In the initial phase, while still actively writing, participants' reading and correcting are done on screen. At some point, however, the text is always printed out on paper. "Silvio" said that he once sent a whole chapter to his publisher without having it locally printed at all. However, this was an exception, and "Silvio," who assiduously worked on the computer, frequently used paper when correcting and editing his own text. However, the print-out frequency varied considerably among the participants, some printing out their text constantly, while others wrote several subchapters before printing. In the subsequent reading and editing process, they made active use of a pen or pencil to correct misspellings, change words and survey the structure of the text. Sometimes this editing leads to major changes, and often it leads to discoveries of deficiencies in their own text, which at times leads to very purposeful reading of scholarly literature on the subject.

During writing, a piece of text is thus read many times. Adding to the number is the fact that other people also read the unfinished text: colleagues, editors, peer reviewers and proofreaders. In fact, a great deal of scholars' reading is of unfinished and unpublished texts, both their own and others'. When asked how many times a randomly chosen sentence in their finished book had been read before publishing, the usual participant reaction was laughter followed by exclamations saying it is hard to tell, but it is certainly many.

Paper, pen and computer

Thus, reading is inside writing, and in much the same way printed paper resides within the computer. In this study, it has become clear that humanist scholars combine rather different text technologies in their literary activities. At the core of the activity is reading, and when reading in the reflective mode, the participants predominantly use printed paper in the form of books and print-outs. When writing, they use software designed to facilitate paper text production, such as Microsoft Word, thus writing with paper genres and paper reading in mind. As an outer shell, the computer system is used for the definitive writing of text, and for storing, disseminating, accessing, skimming and downloading of text. In addition, the computer provides a number of scholarly aids, such as dictionaries and encyclopaedias. Today, one can safely say that humanist scholars have some fingers in a paper based text cycle and the rest

in a digital text cycle. Moreover, by focusing on the physical aspects of reading, the study reveals that indeed three historical systems are in use in scholarly literacy events: the modern computer system, traditional printing and the ancient system of handwriting and annotation.

Discussion

The ongoing transformation of the long-standing written culture has many sides to it, and Chartier warns that "the transfer of a written heritage from one medium to another, from the codex to the screen, would create immeasurable possibilities, but it would also do violence to the texts by separating them from the original physical forms in which they appeared and which helped to constitute their historical significance."[69] Clearly, changes have taken place throughout history, and written discourse is far from static. Editorial philology illustrates how supposedly stable written texts are by no means fixed entities, neither in the manuscript tradition nor within the print culture. Texts change and, as the history of the book reveals, so do their material and typographical representation. Moreover, book history studies give evidence of great variations in reading practices over time.

Nonetheless, since the introduction of the codex, all these changes have taken place without altering the fundamental structure of the book, with its bound collection of written or printed sheets of parchment or paper. In contrast to previous modifications, the digital transformation fundamentally changes the physical form of text. In computers, the written text is no longer physically tied to the surface of a medium that simultaneously stores and represents the text. In the computer system, storing and representation are separated making digital text extremely malleable, moveable, and – through systems of links and search facilities – globally accessible and essentially borderless.[70] According to Chartier, such new material features will inevitably and imperatively require new ways of reading, new relationships to the written word and new intellectual techniques.[71]

As for intellectual techniques, digital characteristics open up new ways of studying classical as well as contemporary scientific, philosophical and literary texts. In the digital humanities, tools have been developed for text corpora search, collation and collocation, comparison of text, study of genealogy, as well as statistical tools for frequency and distribution studies. Even if the potential of digital analytic tools is generally underexploited,

average humanist scholars have indeed changed their reading and working habits. Obviously, the current study does not examine variation over time. However, personal computers and Web technologies are relatively new, and the study shows that scholars habitually use the Web for searching and accessing literature, and that the computer is used for writing, storing and dissemination of text. Furthermore, Carol Tenopir shows that the average number of journal articles read by scholars has risen over the last decennia, whereas time spent on each article has decreased, which might indicate that discontinuous reading has increased.[72] What has not changed significantly are the material and corporal aspects of sustained reading of long-form texts, which is still done on paper actively using hands and fingers, and sometimes a pen.

From the point of view of tradition, these enduring reading habits may be reassuring, as they secure ties to long-lasting written discourses in literature, philosophy and science, in which complex narratives, detailed descriptions and long arguments are important. However, from the point of view of cultural movement, in which written discourse is increasingly dominated by computers and networks, and probably more so among the young, the dependency on paper may be alarming, and before long a critical question could be how to successfully transfer sustained imaginary and reflective reading on to a digital platform.

For digital humanities these issues are important for two reasons – the first being the limited use of critical digital resources, a situation that some researchers argue can only be improved by designing applications that resemble the studying and reading habits of average humanist scholars. The second issue is more profound and relates to questions of cultural heritage. For digital humanists, a main goal is to bring authenticated text from the cultural heritage on to a digital platform, both to provide wide dissemination of high quality texts and to facilitate analytic activity. New digital tools are already being used in studies of texts and language, their origin, development and meaning. However, if these new analytic tools are accompanied by radical new ways of reading and interpreting text, the studied texts are no longer the same, as Chartier has pointed out.[73] Without being able to transfer basic characteristics of traditional reading into the new technologies of text, digital scholars may end up studying a significantly modified cultural heritage, remote from the long-standing tradition of written and printed discourse.

Conclusion

With a focus on text materiality and physical aspects of reading, the current study suggests there are two major obstacles and challenges to long-form text transference. The first is to replicate conditions for continuous reading and imaginary immersion, and the second to create favourable conditions for sustained discontinuous and reflective reading. Whatever the solutions, digital texts will under no circumstances be the same as printed texts and, in relation to reading and studying experiences, it will never be more than a question of proximity. The following reflections take as a premise the use of transformable text formats (such as XML) in transcriptional and editorial practice. Utilising the separation of storage and representation in computer technology, transformable text formats make possible multiple and variable presentations of texts, both on displays and on paper.

With regard to the first challenge of continuous reading, it seems clear that the stationary displays of PCs and laptops are unfit for imaginary immersive reading, for reasons thoroughly accounted for in the study. However, as indicated, there seems to be a relatively easy solution to this particular challenge that nevertheless would require a radical change of attitude for many scholars. Handheld devices, especially dedicated e-readers, seem to be able to fairly well approximate reading experiences of printed books, such as novels, and at the moment e-paper devices seem the most promising. Such devices fit easily into the hand and let users position the body for reading. While the user cannot flick through the pages in the ordinary way, the devices engage the fingers in paging by clicking buttons. They are generally highly readable, easy on the eye, and some devices indicate where the readers are within the overall text. Thus, current e-paper devices create good conditions for transparency and provide an efficient hermeneutic relation between user and technology. In the future, if the navigational and annotating capacities are enhanced, e-paper may prove a viable alternative for reflective study of text. Already, e-paper ought to be considered an alternative by digital humanist sites delivering long-form texts for continuous reading.

As discussed in this paper, reading is influenced by the design of current multipurpose personal computers, with separated displays and keyboards, mouse, widescreens and backlight. Inevitably, computer design will change over time, as shown by experiments with tablets, micro-computers, book-like two-screen solutions, virtual keyboards, touch screens and multimedia reading devices, such as the iPad. New designs

all introduce novel ways of using hands, fingers and eyes, and how these designs affect reading would be interesting issues in future research. However, it is a fact that people can sit in front of computer screens for hours, engaged in all kinds of tasks. In principle, therefore, it should not be impossible to perform onscreen reading activities for substantial periods of time. This study suggests that it is not the intangibility of digital text as such that impedes reading, but rather the distractive way text is usually presented.

The second challenge, to create good conditions for reflective reading, is demanding and will require considerable intellectual and technical ingenuity. Humanist study is often a combination of continuous and discontinuous reading and – as shown in the study – discontinuous ways of reading involve very active use of hands in flicking, underlining and annotating, all within the physical unity of a text. Nor for this purpose is sole reliance on Web browsers fruitful. In the following, based on experiences in the study, I will tentatively present ways of meeting the challenge.

First of all, humanist Web sites should use Web browsers for what they are good at: presenting overviews and accessing information through links and search facilities. They may also be used for highly visual and multimodal presentations, which is important in many branches of the digital humanities. For the rest, Web browsers should be a deliverer of adapted applications, in a layered sandwich structure. In a layered structure, browsers may be the interface for analytic tools, such as collation, corpora search and the like; however, as soon as long-form text and sustained reading is required, readers should to be able to use dedicated reading software. In this software, all the distracting visual elements of web browsers and operating systems should be cleared away and all unnecessary links and graphics removed. Drawing on typographical knowledge, in reading application the focus should be on reading, preferably in a two-layer arrangement with one mode for continuous reading, stripped of everything unnecessary, and one for discontinuous reading, with navigation, highlighting and annotating tools, if possible with links to word processors. In addition to delivering adapted segments of text to dedicated reading applications, it would be beneficial to offer compounds of text prepared for handheld reading devices, such as e-paper and touch screen readers. Versions for print-outs would also be preferable, and in some cases even providing for printed books.

With such a layered design, literary, philosophical or theological texts would be accessible in formats fit for their actual use, which is very often analytic, reflective or imaginary reading, preceding or entwined in ana-

lytic tasks. However, establishing the particular needs of specific groups requires further research. In such research, it would be informative to closely examine how tool-related ways of handling text affect text interpretation, memorisation and reflections on text, as well as the ways different implements integrate reading processes in the overall intellectual work flow. In my view, user accommodation of tools, particularly reading tools, ought to be a main research problem and development task in the digital humanities. Not only could such studies be instrumental in bringing more mainstream humanist scholars to the Web sites, it might even bring texts from the cultural heritage into the digital domain in a fashion that preserves some of the links to the very long tradition of written and printed discourse.

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